FINAL Focused Feasibility Study Report Radiation Technology, Inc. Superfund Site, Operable Unit 3 Rockaway Township, Morris County, New Jersey

Contract No. W912DQ-11-D-3006

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Prepared for:

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Completion of Independent Technical Review

Project: Radiation Technology Superfund Site, OU3
Deliverable: Final Focused Feasibility Study Report
Revision and Date: Rev. 01 - 01/31/14

Ecology and Environment, Inc. has completed the above-referenced deliverable. Notice is hereby given that an independent technical review, that is appropriate to the level of risk and complexity inherent in the project, has been conducted as defined in the Contractor Quality Control Plan. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the customer's needs consistent with law and existing USACE policy. The independent technical reviewers confirmed that all comments were responded to and the changes made in the document as stated. The independent technical review was accomplished by following signatories. All comments resulting from ITR have been resolved.

Robert A Meyer

Date: 1/20/14

Independent Technical Review Team Leader/Project Manager

David P. Cole

Date: 1/31/14

Program Manager

As noted above, all concerns resulting from independent technical review of the project have been considered.

Neil J Brown

1/31/14

Quality Control Manager (Feasibility Study)

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List of Acronyms

ACM	asbestos-containing material
ARAR	applicable or relevant and appropriate requirement
AST	aboveground storage tank
BNA	base, neutral, and acid extractables
CAA	Federal Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	contaminant of potential concern
CRA	Conestoga-Rovers & Associates
CWA	Federal Clean Water Act
E & E	Ecology and Environment, Inc.
EPA	United States Environmental Protection Agency
ERT	Environmental Response Team
ESA	Federal Endangered Species Act
FEMA	Federal Emergency Management Agency
FFS	Focused Feasibility Study
LBP	lead-based paint
MDL	method detection limit
mg/cm^2	milligrams per square centimeter
mg/L	milligrams per liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NESHAP	National Emission Standards for Hazardous Air Pollutants for Asbestos
NHPA	National Historic Preservation Act of 1966, as amended
NJAC	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NOAA	National Oceanic and Atmospheric Administration

List of Acronyms (Cont.)

Non-RDCSRS	NJDEP Non-Residential Direct Contact Health-Based Screening Criteria and Soil Remediation Standards
NRHP	National Register of Historic Places
O&M	operations and maintenance
OSHA	Occupational Safety and Health Administration
OU3	Operable Unit 3
PACM	potential asbestos-containing material
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PLBP	potential lead-based paint
ppm	parts per million
RACM	regulated asbestos-containing material
RAO	Remedial Action Objective
RBSL	risk-based screening level
RCRA	Resource Conservation and Recovery Act
RDCSRS	NJDEP Residential Direct Contact Health-Based Screening Criteria and Soil Remediation Standards
ROD	Record of Decision
RI	Remedial Investigation
RTI	Radiation Technology, Inc.
SHPO	State Historical Preservation Officer
SL	Screening Level
SVOC	semivolatile organic compound
SWQC-FW2	NJDEP Surface Water Quality Standards, Surface Water Quality for Toxic Substances (Fresh Water Criteria)
T&E	threatened and endangered
TBC	to be considered
TCLP	toxicity characteristic leaching procedure
TCR	target cancer risks
Thiokol	Thiokol Chemical Corporation
THQ	non-cancer target hazard quotient

List of Acronyms (Cont.)

TSCA	Toxic Substances Control Act
TSI	thermal system insulation
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound
XRF	X-ray fluorescence
YU	YU & Associates

1 Introduction

The United States Army Corps of Engineers Kansas City District (USACE) in collaboration with Ecology and Environment, Inc., (E & E) prepared this Focused Feasibility Study (FFS) Report for the Radiation Technology, Incorporated (RTI) Superfund Site, Operable Unit (OU) 3 located in the western portion of Morris County, New Jersey, at 108 Lake Denmark Road in Rockaway Township, at the request of the United States Environmental Protection Agency (EPA).

This FFS was prepared to identify potential remedial options that may be implemented as part of a proposed remedial action, which is intended to address remaining on-site structures (buildings, foundations, and slabs), aboveground storage tanks (ASTs), sewage treatment plants, cisterns, wall-mounted transformers, asbestos-containing materials (ACM), and lead-based paint (LBP) located within OU3. This FFS is limited to focus on two selected remedies to address contamination observed within or immediately in the vicinity of the structures that compose OU3 of the RTI Site as described below. The remedies to be evaluated under this FFS include decontamination of structures and demolition of structures. This FFS report is based on the findings of the *Remedial Investigation Report, Operable Unit 3, Radiation Technology Superfund Site, Rockaway Township, New Jersey* (E & E 2013).

1.1 Purpose and Organization of Report

This FFS Report was developed in accordance with applicable EPA guidance documents, including:

- *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final* (EPA 540/G-89/004, OSWER 9355.3-01, October 1988);
- *The Feasibility Study, Development and Screening of Remedial Action Alternatives* (OSWER 9355.3-01FS4, November 1989);
- *The Feasibility Study: Detailed Analysis of Remedial Action Alternatives* (OSWER 9355.3-01FS4, March 1990);
- *Land Disposal Restrictions as Relevant and Appropriate Requirements for CERCLA Contaminated Soil and Debris* (OSWER 9347.2-01, June 1989); and
- *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (OSWER 9355.0-75, July 2000).

This report is divided into five sections. Section 1 provides background information and summarizes the findings of previous RTI site investigations and reports. Section 2 screens potential remedial technologies, Section 3 develops comprehensive site alternatives, and Section 4 provides a detailed analysis of the alternatives using EPA evaluation criteria. Section 5 lists the references used within this report.

1.2 Background Information

Background information is summarized from the 2013 OU3 Remedial Investigation (RI) Report (E & E 2013). The RI Report includes a brief summary of investigations completed for Site groundwater (OU1) and potential groundwater contaminant sources (OU2), such as soil, sediment, and surface water. Investigations related to OU1 and OU2 have been conducted in all areas of the RTI property dating back to 1980 and have shown groundwater contaminated with volatile organic compounds (VOCs), polynuclear aromatic hydrocarbon (PAHs), and metals. A remedial action approach has been developed for OU1and is presented in a USEPA Record of Decision (ROD) issued May 9, 1994. Additionally, an OU2 RI report was completed in November 2008. At this time, only interim clean-up actions have been completed at the Site for OU1 and OU2. The remedial actions proposed for OU1 will be initiated after OU3 has been fully characterized and remedial alternatives have been developed under this FFS. Unless related to on-site structures, the analytical results from investigations conducted under OU1 and OU2 are not included as part of this FFS.

1.2.1 Site Description

The former RTI site is located at 108 Lake Denmark Road, Rockaway Township, New Jersey (see Figure 1-1), near the small residential community of Lake Telemark, New Jersey, in the western portion of Morris County. The area around the site is generally low-density residential. To the west and southwest of the site, significant heavy industrial activities have been ongoing at the Picatinny Military Arsenal facilities since the early 1990s. Areas to the east of the site consist mainly of single-family residences.

Land use at and around the site is generally considered light industrial and commercial. It consists of 263 acres of land (see Figure 1-2) and is divided into the following developed areas: RTI Area (15 acres, currently occupied by Sterigenics International, which is not included in OU3), East Stand Area (22 acres), South Stand Area (27 acres), and P2 Area (16 acres). The remaining portion (183 acres) consists of undeveloped land. The RTI Area and the undeveloped land are not included as part of OU3. The four developed areas of the site are considered restricted from public access. OU3 consists of 34 historically industrial or commercial structures. Most of the structures are in poor condition after having been vacant and/or having received no maintenance since 2006.

1.2.2 Site History

Prior to 1941, the RTI Superfund Site was owned by the Singer Manufacturing Company. Reaction Motors, Inc. purchased the property in 1941 and in approximately 1947 began the construction of facilities to support rocket engine and component testing programs. Reaction Motors, Inc. was acquired by a corporate predecessor to the Olin Corporation in 1953 and thereafter by Thiokol Chemical Corporation (Thiokol) in 1958. In 1964, Reaction Motors, Inc., was formally combined with Thiokol and became a separate working division within the company (CRA 2010). A 1991 RI Report provides a detailed summary of historical building use (Acres 1991).

In 1972, RTI purchased a 15-acre parcel of the site (now known as the RTI Area) and conducted irradiation activities until it sold these operations in 1996. In 1978, RTI purchased the remaining 248 acres of the site from Thiokol and leased portions of the property to various tenants (CRA 2010). Sterigenics International continues to occupy buildings within the RTI Area.

In November 1999, RTI filed for Chapter 11 bankruptcy. As a result, the New Jersey Department of Environmental Protection (NJDEP) identified RTI as an unresponsive, recalcitrant responsible party. After RTI declared bankruptcy, the NJDEP requested that the EPA assume oversight of the project, to which EPA agreed in January 2001. Alliant Techsystems, Inc. (the successor to Thiokol) has also been identified as a Potential Responsible Party for the site and has been involved in the remediation of additional OUs at the Site. Since RTI declared bankruptcy, there has been no financially solvent owner of the site. Although RTI was no longer an active owner of the property, various tenants remained in the East Stand, South Stand, and P2 areas until 2006, when the EPA took control and evicted the tenants. The entire site was added to the National Priorities List in September 1983 and the property was fenced and gated with signage posted to prevent public access (CRA 2010).

As stated previously, OU3 consists of 34 structures in the P2 Area, East Stand Area, and South Stand Area. The historical use of each structure, as described below, was derived from the various reports reviewed by E & E. The current use of each structure was determined during the October 2012 site walkover and April 2013 sampling events conducted by E & E.

1.2.2.1 P2 Area

The P2 Area consists of eight structures. Seven of the structures had indoor, subslab, and/or outdoor surface soil contamination identified in samples collected during investigations prior to 2013. To assist in the development of remedial alternatives and additional characterization to be used in this FFS, four structures underwent additional sampling during the April 22 through 26, 2013, RI field sampling event. A summary of historical and current conditions for each of the eight structures is provided below.

R-47

R-47 is a large, unoccupied building/warehouse (approximately 190 feet by 74 feet) with steel framing covered by galvanized sheet metal for the siding and roof. It was historically used as a rocket fueling station for the Bullpup B rocket. During operation, R-47 contained six rocket fueling bays with an overhead crane and tracks that were used to move the rockets. It was also used for rocket motor assembly and later for fiberglass boat manufacturing, a machine shop, and auto restoration. The building was identified by E & E as having potential reuse value.

Existing debris located inside R-47 includes wood framing, tires, wood debris, metal shelves, desks, frames, metal containers, plastic boxes for sample cores, buckets, insulation, empty plastic containers, and bags of concrete. The concrete slab floor along the southern portion of the building shows staining where several drums had been previously located. An AST is located outside the west end of the structure. During the April 2013 field investigation activities the AST was observed to be empty and dry.

Paint Locker

The paint locker is a small, unoccupied building (approximately 35 feet by 15 feet) with insulated concrete block walls and a metal roof formerly used for paint storage. The building is filled with non-hazardous debris including Rad Nuts™[1], wood boxes, metal containers, and cardboard boxes. The building was identified by E & E as having potential reuse value.

Fuel Storage Tank

The fuel storage tank area consists of a concrete foundation. Historically, this area was used to store mixed amine fuel in a 4,000-gallon AST (CRA 2010), which has been removed from the area. The structure was determined by E & E to have no reuse value.

Igniter Storage

The Igniter Storage bunker is a small, unoccupied metal frame building (24 feet by 12 feet) with steel siding and steel roof. The building was formerly used as an igniter storage bunker. The building was identified by E & E as having potential reuse value.

Acid (Oxidizer) Storage Tank

The acid (oxidizer) storage tank area consists of a concrete containment area (30 feet by 30 feet) with two tank stands that consist of bare concrete saddles. The ASTs have been removed. Pipes in the northeast corner of the containment area appear to be former water and chemical lines. Several feet of dirt, debris, and

[1] Rad Nuts™ were plastic dowels and rings manufactured to act as replacements for lost nuts and bolts. They were first heated to make them pliable after which they would take on the shape of the missing nut or bolt when screwed into place. Once cooled, Rad Nuts™ would retain their new shape and could be removed and reused as needed. Rad referred to the slang term for radical not radiation.

brush are present on top of the former tank stands. A cinderblock containment wall, approximately 3 feet high, surrounds the storage tank area on three sides. Debris (predominantly plastic waste) appears to be from the "Rad" nut and bolt manufacturing process and includes metal framing, tires, and layers of soil and leaves. The structure was determined by E & E to have no reuse value.

Pump House 2 (P-2)

The Pump House 2 (P-2) is a small, unoccupied metal frame building (12 feet by 24 feet) with steel siding and a steel roof that was used as a water pump house. The building was historically used as part of the facility's water system and contains a vertical water tank (possibly a chlorinator) and electrical equipment. The structure was determined by E & E to have no reuse value.

R-43

R-43 is an unoccupied, collapsed metal Quonset hut on a concrete foundation (16 feet by 32 feet). No historical use has been identified for this building in previous reports. The collapsed hut contains trash and an empty 30-gallon drum that appears to have contained a petroleum product. The building was determined by E & E to have no reuse value.

R-34

R-34 is an unoccupied building (approximately 80 feet by 75 feet) consisting of a concrete floor and a combination of concrete block and sheet metal walls. Historically, R-34 was used to test diesel engines. Previous reports stated that mufflers exhausted through the roof, which could indicate that two diesel test stands were present at one point in time. The building currently contains debris including wood, metal from door frames, plastic tubing, wood pallets, cinderblocks, Rad Nuts™, wood flooring tiles, old heaters, electrical panels, an AST, an empty 55-gallon drum, and computer equipment. During the most recent sampling event, floor drains and a wall-mounted transformer containing oil were observed in the building. The building was identified by E & E as having potential reuse value.

1.2.2.2 South Stand Area

The South Stand Area consists of nine structures. Six of the buildings had indoor, sub-slab, and outdoor soil contamination based on analytical results of samples collected during investigations prior to 2013. To assist in the development of remedial alternatives and provide additional characterization to be used in this FFS, eight structures underwent additional sampling during the April 22 through 26, 2013 RI field sampling event. A summary of historical and current conditions for each structure is provided below.

Test Stand 12 (S-12)

Test Stand 12 is an unused, multi-story poured concrete and steel structure (approximately 100 feet by 400 feet) with three test bays and an interior control room with a floor drain. Debris inside S-12 includes sheets of wood and boards, a bucket, and approximately 60 tires. Debris surrounding the structure includes

tires, wood, hoses, and bricks. The middle test bay has a pile of debris approximately 10 feet in height. Historically, this structure was used as a rocket motor test stand. The building was determined by E & E to have no reuse value.

S-46

S-46 is an unoccupied warehouse (120 feet by 40 feet) consisting of concrete block walls and a steel truss and concrete roof. An empty AST is present on the ground immediately south of the building. The building was formerly used to house a boiler, equipment storage, offices, and a machine shop. Most recently S-46 was used to repair and maintain small engine equipment such as lawn mowers. S-46 currently contains lawnmowers, desks, office supplies, plastic debris, motors, empty oil/gasoline cans, cardboard boxes, wood pallets, dust/leaf blowers, metal brushes, unlabeled 30-gallon drums, jars and plastic bottles, tires, plastic tarps, fluorescent lightbulbs, metal pipes, a metal work bench, and an eyewash stand. The building was identified by E & E as having potential reuse value, but there is a hole in the roof where a tree fell onto the building.

Test Stand 11 (S-11)

Test Stand 11 is an unoccupied, poured concrete and steel structure (approximately 45 feet by 25 feet) with four test bays, no interior area, and minimal debris. North of the bays are four pipes that extend from under the ground in an area that may have been used for storage tanks. There is a cinderblock wall beyond this area, but the wall does not extend around the bays. The northern portion of S-11 is overgrown with vines and contains organic debris. A shed (8 feet by 10 feet) surrounded by chain-link fencing is located northeast of the test stand. Historically, this structure has been used as a rocket motor test stand. The structures were determined by E & E to have no reuse value.

Test Stand 37 (S-37)

Test Stand 37 is an unoccupied, poured concrete and steel structure (approximately 45 feet by 40 feet) with three test bays. Currently S-37 contains minimal debris; however, the floor in the bay areas was observed to be weathered and discolored. The northern portion of S-37 is overgrown with vines and contains organic debris. The historical use of this area was solid motor fuel mixing and casting. The structure was determined by E & E to have no reuse value.

Propane Storage Area

The Propane Storage Area is an unoccupied area (22 feet by 31.5 feet) enclosed by chain-link fence. A concrete slab is constructed over the entire area. All propane tanks have been removed but piping remains. The structure was determined by E & E to have no reuse value.

No. 1 Sewage Treatment Plant

The No. 1 Sewage Treatment Plant consists of a separator chamber and effluent tank (approximately 37 feet by 15 feet) and partially buried cylindrical AST manufactured by the Chicago Pump Company. The system is labeled “Rated

Aeration Sewage Treatment Process" and contains two rotary blowers and one agitator. The equipment is in disrepair. During the April 2013 sampling event the sewage treatment plant contained approximately 8.10 feet of water but no sludge was observed in the structure. The structure was determined by E & E to have no reuse value

S-48

S-48 is a bare concrete pad (approximately 30 feet by 40 feet). The building was removed sometime after 2005, but had previously been used as a lawnmower repair/salvage shop and a private automotive repair garage and equipment storage area. The structure was determined by E & E to have no reuse value.

T-50

T-50 consists of a concrete pad approximately 18 feet by 45 feet. The concrete pad has a layer of weathered tile that was adhered to the concrete using black mastic. No historical use is known for this structure. The structure was determined by E & E to have no reuse value.

S-49

S-49 consists of two concrete pads. The southern pad is completely covered with water and overgrown with marsh-like vegetation. The northern pad is mostly overgrown with moss, and only the northern portion of this pad was visible. A dilapidated door frame is present on the south end of the southern pad. There are also dilapidated cinderblock walls around the perimeter of the pads. S-49 historically housed the exhaust tank with underground cisterns. The structure was determined by E & E to have no reuse value.

1.2.2.3 East Stand Area

The East Stand Area consists of 17 structures. Thirteen of the structures had indoor, sub-slab, and outdoor soil contamination based on analytical results from samples collected during investigations prior to 2013. To assist in the development of remedial alternatives and to provide additional characterization to be used in this FFS, the 13 contaminated structures underwent additional sampling during the April 22 through 26, 2013 RI field sampling event. A summary of historical and current conditions for each structure is provided below.

Test Stand 2 (R-2)

Test Stand 2 (R-2) is a large concrete and steel structure (approximately 50 feet by 75 feet in area and 30 feet high on the southwest side) with one rocket motor test bay. The test stand contains corrugated galvanized steel pipes (approximately 3 feet in diameter) on each side going through the concrete structure. There is a large pile of debris located in the bay approximately 20 feet in height. The debris at R-2 includes metal, small pieces of concrete, crushed computer parts, broken ceramic, wood, and bikes. Test Stand 2 historically was used as a large motor test stand. The structure was determined by E & E to have no reuse value.

R-33
R-33 is a small (approximately 9 feet by 12 feet), insulated, galvanized aluminum sheet metal building with steel framing, utilities, and an air vent built into the roof. Debris observed within the shed includes approximately 15 (1-foot by 4-foot) metal grates, wood pallets, and organic material such as leaves. Additionally, a 3-foot by 8-foot concrete pad, possibly used for an AST, is located adjacent to R-33. This building had evidence of a recent fire inside. No historical use for this building is available. The building was identified by E & E as having potential reuse value.

R-29
R-29 is an empty storage building (approximately 20 feet by 40 feet) consisting of galvanized sheet metal with steel framing and utilities. The building contains a plastic bin, tires, wood, paper debris, 3.3-inch floppy disks, and several trash bags filled with unknown items secured with tape. Historical uses for this structure include storage for documents and miscellaneous administrative items. The building was identified by E & E as having potential reuse value.

R-21
R-21 is a concrete building (approximately 60 feet by 70 feet), which was built into the hillside on the north and east sides. A front portion of the building consists of poured concrete walls, and the back portion is concrete block walls. The ceiling is concrete. During a previous field investigation, approximately 30 drums/containers (55-, 30- and 5-gallon) were observed in a room at the southern corner of the building. These drums have since been managed and removed from the site. Debris located in other rooms at R-21 includes approximately four plastic drum totes/overpacks, wood, plastic totes, fallen ceiling tiles, metal water tanks, empty metal drums, and broken floor tiles. A concrete AST saddle is located on the south side of the building, although the AST has been removed. The historical uses for this building are as a boiler house, sewage treatment control center, and instrument center. The building was identified by E & E as having potential reuse value.

Pump House 3 (P-3)
Pump House 3 (P-3) is an unoccupied shed (8 feet by 8 feet) that was used as a water pump house. The structure contains piping, electric utility lines, and two water tanks (60 gallons each). The shed is constructed of 2-foot by 4-foot fiberboard panels with a corrugated metal outer surface. The structure was determined by E & E to have no reuse value.

Test Stand 3 (R-3)
Test Stand 3 (R-3) is a former rocket motor test stand that contained an exhaust scrubber and effluent treatment equipment. R-3 consists of one concrete test bay. Two abandoned ASTs were observed lying on the ground on the north side of the structure. Minimal debris was observed near the test bay during the recent field investigations. The structure was determined by E & E to have no reuse value.

Pump House 4 (P-4)

Pump House 4 (P-4) is a former water pump house that consists of an unoccupied shed (10 feet by 12 feet) constructed of galvanized sheet metal with steel framing and utilities on a concrete slab. No pumps were observed during site investigations. The structure was determined by E & E to have no reuse value.

R-51

R-51 is a metal building formerly used as the boiler house for R-4 activities and associated with a fuel oil tank (T-51). The building is empty except for office debris, broken glass, wood, fiberglass insulation, particle board walls, wood framing, and pipe remaining from T-51. The fuel oil AST, located to the south of the building, is 12 feet in diameter by 16 feet tall, and surrounded by an earthen berm. The building was identified by E & E as having potential reuse value.

Test Stand 4 (R-4)

Test Stand 4 (R-4) is a large building, which consists of concrete for the foundation slab, walls on three sides, and roof. The back wall of the building consists of galvanized sheet metal on steel framing. A smaller building attached to the larger building and also part of R-4 consists of a concrete foundation, concrete block walls and a metal roof. Test Stand 4 was used for testing of developmental engines, which ran on mixed hydrazine and nitrogen tetroxide. Remnants of instrumentation, one large rocket motor test room, four smaller test rooms, and two small laboratories were observed during field investigations. The test rooms were constructed with drainage troughs that discharge outside the building. Debris observed within the building includes metal, electrical panels, broken ceramic, plastic sheeting, wood, fluorescent lights, insulation, ceiling tiles, and pipes. Each of the test rooms contains packaged chillers manufactured by Edwards Engineering Corporation that are labeled as containing Refrigerant-22 (R-22). The building was identified by E & E as having potential reuse value.

Cistern/Cistern Pump

The Cistern/Cistern Pump consists of two, 6-foot-diameter buried concrete vaults adjacent to a 4-foot by 6-foot concrete slab. These vaults were observed to be filled with water during site investigations. The Cistern/Cistern Pump is approximately 4 feet 10 inches deep. The structure was determined by E & E to have no reuse value.

No. 2 Sewage Treatment Plant

The No. 2 Sewage Treatment Plant consists of a separator chamber and effluent tank and was used for sewage treatment of the South Stand Area. The No. 2 Sewage Treatment Plant layout is similar to that of the No. 1 Sewage Treatment Plant. The structure was determined by E & E to have no reuse value.

Scrubber
Only a bare concrete foundation remains from this structure. The Scrubber building was designed to clean exhaust gases from test firings of rocket motors. The scrubber collected exhaust gases from rocket tests performed at Test Stand 3 (R-3). The gases would have passed through the scrubber, into what appears to be a settling basin with an overflow that ultimately discharged to the west through an opening. The structure was determined by E & E to have no reuse value.

Water Cooling Tower
The Water Cooling Tower is a wooden structure with two large fans on the roof and a concrete foundation. During field investigations, there were approximately 6 inches of standing water within the structure. Additional debris observed within the structure included wood and fiberglass. The structure was determined by E & E to have no reuse value.

Condenser and Hot Well
The Condenser and Hot Well consist of a concrete settling basin with one large chamber that overflows into a second, smaller chamber. The condenser and hot well received fluids from Test Stand 4 (R-4). The structure was determined by E & E to have no reuse value.

Transformer Bank
All that remains of the Transformer Bank is a chain-link fence approximately 25 feet wide by 15 feet long on three sides. Power poles are located adjacent to the fenced area, and one power pole is also located inside the fenced area. No concrete pads or transformer support structures were observed within the fenced area during site investigations.

Water Tower Area
Although counted as one structure, this area actually consists of one water tower consisting of an elevated cylindrical tank supported by a braced rectangular steel frame on four concrete piers, and a water tank consisting of a cylindrical sheet iron tank on a poured concrete pad with an associated cinderblock pump house. The total height of the water tower (including the legs) is approximately 125 feet and it is not currently in use. The total height of the water tank (on ground, no legs) is approximately 80 feet. The water tank is currently used for fire protection by Sterigenics. An AST and wood-framed shed are located between the water tower and water tank and are also included as part of the Water Tower Area. Only the portions of these structures that were accessible from ground level were evaluated during the RI field work.

Agitator and Effluent Treatment Basin
The Agitator and Effluent Treatment Basin consists of a small shed (10 feet by 10 feet) with a lower effluent treatment basin (22 feet by 30 feet). The lower basin has a concrete floor and is surrounded by a 3-foot-tall cinderblock wall with a

concrete overflow that discharges to the east of the structure. The structure was determined by E & E to have no reuse value.

Areas Not Addressed

The RTI Area and areas outside of the RTI Superfund site fence line are not addressed under OU3. Additionally, non-industrial-type buildings (such as the guard shack and water towers) were not included in the assessment investigation conducted under the RI report for OU3.

The East Stand Area Water Tower located in the East Stand Area was not originally included in the RI investigation for OU3; however, a visual survey of the Water Tower was conducted under this FFS on December 12, 2013, to evaluate its structural integrity and identify whether asbestos may be present. No analytical data was collected from this structure to characterize potential contamination. A visual survey was performed by YU & Associates, Inc. (YU) under the direction of the USEPA to identify the current condition of the structure that has resulted from age and wear.

Based on the visual inspection of the Water Tower, YU reported the overall existing structural condition appears to be good and the structure is not in an immediate danger of structural failure. However, due to lack of design documentation (e.g., calculations, drawings, design criteria) and access limitations during the survey, additional structural evaluations and surveys are proposed to be completed under the pre-design phase of any remedial action.

1.3 Nature and Extent of Contamination

For this FFS, data obtained from the four most recent investigations has been used to define the nature and extent of contamination at the RTI site. The focus of this FFS will be limited to OU3, which consists of residual contamination of the remaining structures. It should be noted that addressing groundwater and groundwater source contamination (i.e., OU2 soils, sediment, and surface water) in a remedial action is beyond the scope of this FFS and will not be addressed in this report.

The following investigations were used in the development of this section:

- March and April 2005: EPA Region 2 and the EPA/Environmental Response Team (ERT) completed a multi-media sampling of paint chips, potential asbestos-containing material (PACM), and soil (Lockheed Martin Technology Services/Environmental Services REAC 2005).
- September – November 2008: Conestoga-Rovers & Associates (CRA) conducted two phases of an RI at the RTI site at the request of the EPA. Subject media included soil, sediment, surface water, and tank contents (CRA 2010).

- January – April 2010: EPA Region 2 and the EPA/ERT completed further sampling to generate site-specific contaminant data. Sampling included selected buildings for asbestos, lead paint, and other contaminants, in addition to utility pole transformers and underlying soil for polychlorinated biphenyls (PCBs) (Lockheed Martin SERAS 2010).
- April 2013: E & E, under contract with the USACE, completed further sampling to generate site-specific contaminant data associated with data gaps identified in the *Technical Evaluation Memorandum for the Radiation Technology Superfund Site, Operable Unit 3* (E & E 2012). Subject media included soil, sediment, concrete, and cinderblock chip samples, and tank contents. The results of this investigation are reported in the *Remedial Investigation Report, Operable Unit 3, Radiation Technology Superfund Site, Rockaway Township, New Jersey* (E & E 2013).

Analytical results were screened to identify samples and analyte levels that may represent a possible threat to human health and/or the environment. For screening purposes, concrete, cinderblock, caulk, and soil samples were compared with the May 7, 2012 NJDEP Residential and Non-Residential Direct Contact Health-Based Screening Criteria and Soil Remediation Standards (RDCSRS and Non-RDCSRS). The RDCSRS are referred to in the NJDEP Solid and Hazardous Waste Management Program Guidance for Characterization of Concrete and Clean Material Certification for Recycling (NJDEP 2010). The Non-RDCSRS was also used for additional evaluation in case the RDCSRS were exceeded. The NJDEP remediation standards do not have a screening level for perchlorate. Therefore, the May 2013 EPA Regional Screening levels for Soil (Residential and Industrial) for perchlorate were used. Water samples were compared to the NJDEP Surface Water Quality Standards, Surface Water Quality for Toxic Substances (Fresh Water Criteria [SWQC-FW2]). Oil samples were not compared to risk levels, but were evaluated against federal and state standards for disposal options.

1.3.1 Concrete and Cinderblock Sampling Results

Quantitative results of concrete and cinderblock sampling were compared to screening criteria in order to identify Contaminants of Potential Concern (COPCs). A summary of the COPCs are described below and presented in Table 1-1.

1.3.1.1 P-2 Area

A total of four structures (R-47, Paint Locker, Acid (Oxidizer) Storage Tank, and R-34) underwent concrete and cinderblock sampling in the P2 Area. A summary of the analytical results for the P-2 Area is provided in Table 4-1 of the RI Report (E & E 2013). The following is a summary of contaminants identified in the concrete and cinderblock samples:

- Metals – Antimony, arsenic, lead, manganese;

- PCBs and Pesticides – Aroclor 1248, Aroclor 1254, 4-4'-DDE, Dieldrin, gamma-BHC (Lindane), gamma-Chlordane; and
- Polynuclear aromatic hydrocarbons (PAHs) - Benzo(a)pyrene, benzo(a)anthracene.

Arsenic, lead, and manganese were detected at levels above the Non-RDCSRS and RDCSRS for the sample collected from the cinderblock wall at Building R-47. Antimony was detected above RDCSRS levels for the duplicate sample collected from the floor slab of Building R-34. Calcium, chromium, iron, magnesium, potassium, and sodium were also detected in the samples collected from building R-47, the Paint Locker, the Acid (Oxidizer) Storage Tank, and building R-34; however, none of these analytes have screening standards.

PCBs were detected at concentrations above the RDCSRS and Non-RDCSRS for solid waste in both the concrete floor slabs and the cinderblock samples collected at Building R-47. Pesticides were also detected in the concrete slab samples for R-47. The cinderblock and concrete slab samples collected from building R-34 contained levels of PCBs above RDCSRS levels.

PAHs were detected at concentrations above RDCSRS and Non-RDCSRS for solid waste in cinderblock samples collected at the Paint Locker. Perchlorate was not detected at levels that exceeded the respective screening standards for any of the samples collected from concrete slabs or cinderblock for the P-2 Area.

1.3.1.2 South Stand Area

A total of eight structures (Test Stand 12 [S-12], S-46, Test Stand 11 [S-11], Test Stand 37 [S-37], No. 1 Sewage Treatment Plant, S-48, T-50, and S-49) underwent concrete and cinderblock sampling in the South Stand Area. A summary of the analytical results for the South Stand Area is provided in Table 4-2 of the RI Report (E & E 2013). The following is a summary of contaminants detected in the concrete and cinderblock samples:

- PCBs and Pesticides – Aroclor 1254, 4-4'-DDE, Dieldrin, gamma-Chlordane

PCBs were detected at concentrations above both the RDCSRS and Non-RDCSRS criteria for the concrete slabs sampled at Test Stand 12 (S-12) and Building S-46. RDCSRS criteria were also exceeded for PCBs in the cinderblock sample and for Dieldrin and gamma-Chlordane in concrete samples at Building S-46.

1.3.1.3 East Stand Area

A total of 12 structures (Test Stand 2 [R-2], R-33, R-29, R-21, Test Stand 3 [R-3], R-51, Test Stand 4 [R-4], Cistern/Cistern Pump, Water Cooling Tower, Condenser and Hotwell, Water Tower, and Agitator and Effluent Treatment Basin) underwent concrete and cinderblock sampling in the East Stand Area (concrete or

cinderblock samples were not collected from one of the 13 structures). A summary of the analytical results for the East Stand Area is provided in Table 4-3 of the RI Report (E & E 2013). The following is a summary of contaminants detected in the concrete and cinderblock samples:

- Metals –Lead;
- PCBs and Pesticides – Aroclor 1248, Aroclor 1254, Aroclor 1260, Dieldrin; and
- PAHs - Benzo(a)anthracene.

Lead concentrations exceeded RDCSRS for one of the concrete slab samples from Test Stand 4 (R-4). Building R-21 exceeded the RDCSRS criteria for benzo(a)-anthracene. No other buildings or structures contained metals or semivolatile organic compounds (SVOCs).

PCBs were observed above RDCSRS criteria in concrete slab and/or cinderblock samples collected from Test Stand 2 (R-2), Test Stand 4 (R-4), and Building R-21, as well as from the sample collected from the condenser at the Condenser and Hot Well structure. One concrete sample within each of R-21 and R-4 were above Non-RDCSRS criteria for PCBs. Dieldrin exceeded RDCSRS levels in a concrete sample at R-21.

1.3.2 Tank Contents Sampling Results

Quantitative results of tank contents sampling were compared to screening criteria in order to identify COPCs. A summary of the detected analytical results for the tank samples are provided in Table 4-4 of the RI Report (E & E 2013). Water sample analytical results are provided in Table 4-5 in the RI Report (E & E 2013). A summary of the COPCs are described below and presented in Table 1-1.

1.3.2.1 P-2 Area

The only liquid sample available from the P-2 Area was oil observed within the wall-mounted transformer located in Building R-34. Based on the detected contaminant concentrations, the following COPCs were identified:

Transformer Oil:

- PCBs – Aroclor 1254, Aroclor 1260

PCBs identified in the transformer oil exceed both the RDCSRS and Non-RDCSRS screening criteria for disposal.

1.3.2.2 South Stand Area

The only liquid sample collected from the South Stand Area was obtained from the water contents of the No. 1 Sewage Treatment Plant. Based on the detected contaminant concentrations, no COPCs were identified for the surface water sample at this location.

1.3.2.3 East Stand Area

A water sample was collected from the Cistern/Cistern Pump and the No. 2 Sewage Treatment Plant located within the East Stand Area. Based on the detected contaminant concentrations, the following COPCs were identified:

Water:

- Metals –Chromium, lead;
- PCBs – Aroclor 1248; and
- Pesticides – gamma-Chlordane.

Only the Cistern/Cistern Pump had detected contaminants above screening levels. Chromium was detected at levels greater than both the SWQC-FW2 Acute and Chronic Standards. The detected lead and Aroclor 1248 concentration exceeds SWQC-FW2 chronic criteria. Only the duplicate sample at the Cistern exceeded the standard for pesticides for gamma-Chlordane; however, it should be noted that the exceedance is due to the method detection limit (MDL) being higher than the screening level.

Sludge:

- Metals – Arsenic, lead; and
- Base, neutral, and acid extractables (BNAs) – Benzo(a)anthracene, benzo(a)pyrene.

Sludge present at the No. 2 Sewage Treatment Plant had detected levels of metals and BNAs above screening levels for Non-RDCSRS criteria. AST T-51 historically contained sludge. Results of sludge analysis indicated contamination that was consistent with fuel oil constituents; however, during the April 2013 sampling event this tank was observed to be dry and empty (E & E 2013).

Two samples were collected from the AST located at the Water Tower Site. The sample results did not exceed disposal criteria associated with the AST liquid.

1.3.3 Soil Sampling Results

Historically, surface and subsurface soil sampling was performed to identify potential groundwater source contamination as part of OU2. This FFS only evaluates sub-slab soil sampling results in order to determine the potential for exposure to future demolition workers. A summary of the analytical results for soil samples are provided in Table 4-6 of the RI Report (E & E 2013). Quantitative results of soil sampling were compared to screening criteria in order to identify COPCs. A summary of the COPCs is described below and provided in Table 1-1.

1.3.3.1 P-2 Area

Five sub-slab soil samples were collected from the P-2 Area; three from Building R-47 and two from Building R-34. Based on the detected contaminant concentrations, the following COPCs were detected in sub-slab soil:

- Metals – Antimony, arsenic, cadmium, lead, manganese, zinc; and
- SVOCs – Benzo(a)pyrene, benzo(b)fluoranthene, pyrene.

1.3.3.2 South Stand Area

Two sub-slab soil samples collected from the South Stand Area were located in Building S-46. Based on the detected contaminant concentrations, the following COPCs were detected in sub-slab soil:

- Metals – Antimony, arsenic, cadmium, chromium, lead, manganese, zinc; and
- SVOCs – Benzo(a)pyrene, benzo(b)fluoranthene, pyrene.

1.3.3.3 East Stand Area

One sub-slab soil sample collected from the East Stand Area was located in Building R-21. Based on the detected contaminant concentrations, the following COPC was detected in sub-slab soil:

- SVOC – Benzo(a)pyrene.

Benzo(a)pyrene was detected at a level exceeding Non-RDCSRS criteria for the duplicate sample only.

1.3.4 Caulk Sampling Results

In accordance with *NJDEP Solid and Hazardous Waste Management Program Guidance for Characterization of Concrete and Clean Material Certification for Recycling* (NJDEP Guidance for Recycling), caulk was analyzed for SVOCs and PCBs. A summary of analytical results are provided in the RI Report in Table 4-1 (P-2 Area), Table 4-2 (South Stand Area), and Table 4-3 (East Stand Area), respectively (E & E 2013). Based on the elevated concentrations detected in these samples, COPCs have been identified as summarized below.

1.3.4.1 P-2 Area

PCBs were detected at concentrations above the Non-RDCSRS and RDCSRS for solid waste in the caulk sample collected in the Paint Locker. The caulk sample was a composite sample collected from the windows and doors, as available, in areas in immediate contact with the cinderblock walls.

1.3.4.2 South Stand Area

PCBs were detected at concentrations above the Non-RDCSRS and RDCSRS criteria for the caulk sample collected from a door frame at Test Stand 12 (S-12). Within building S-46, a caulk sample collected from the door frame indicated concentrations of PCBs exceeding RDCSRS.

1.3.4.3 East Stand Area

PCBs were detected at concentrations above the Non-RDCSRS and RDCSRS criteria for the caulk sample collected from along the door frame within Building R-21.

1.3.5 Potential Asbestos-Containing Material Sample Results

PACM samples were collected from structures associated with OU3. A summary of the results follows.

P2 Area: ACM was identified within Building R-47, the Igniter Storage Building, Pump House 2, and Building R-34. ACM includes various floor tiles and associated mastic, window caulking, tar, pipe insulation, transite, and cloth cushions.

South Stand Area: ACM was identified within Test Stand 12 (S-12), Building S-46, Test Stand 11 (S-11), and Test Stand 37 (S-37). ACM includes various floor tiles and associated mastic, door caulking, window caulking, flashing, tar, roofing tar paper, and transite.

East Stand Area: ACM was identified within Building R-29, Building R-21, Water Tower, Building Associated with the Water Tower, Building R-51, Test Stand 4 (R-4), and the Water Cooling Tower. ACM includes various floor tiles and associated mastic, joint material, window caulking and glazing, tar and tar sealant, pipe insulation, and thermal system insulation (TSI) fittings/elbows.

1.3.6 Potential Lead-Based Paint Sample Results

A potential lead-based paint (PLBP) inspection was performed using an X-Ray Fluorescence (XRF) analyzer to screen painted surfaces, as well as by collecting and analyzing paint chip samples. Lead concentrations greater than 0.5% by dry weight or 1 milligram per square centimeter (mg/cm^2) indicates the samples contained LBP as per 40 CFR Part 745.223. The following structures were found to contain LBP:

P2 Area: Building R-47, Paint Locker, Igniter Storage, Building R-43, and Building R-34.

South Stand Area: Building S-46.

East Stand Area: Test Stand 2 (R2), Building R-33, Building R-21, Pump House 3, Test Stand 3 (R-3), Building R-51, Test Stand 4 (R-4), Water Tower, and the Building Associated with the Water Tower.

Disturbances to painted surfaces containing lead shall be treated as potential lead hazards to workers, and require worker projection. LBP must be disposed of as a hazardous waste during demolition for those areas where toxicity characteristic leaching procedure (TCLP) testing detects lead concentrations of 5 milligrams per

liter (mg/L) or greater of lead (YU Associates 2013). TCLP analysis was not performed on any samples.

1.4 Screening-Level Risk Assessment

This section summarizes the Screening-Level Risk Assessment as presented in the *Remedial Investigation, Operable Unit 3, Radiation Technology Superfund Site, Rockaway Township, New Jersey*, previously prepared for the EPA by USACE and dated August 2013 (E & E 2013).

1.4.1 Background and Conceptual Site Model

All laboratory-generated analytical data from the April 2013 site investigation were compiled and used in the screening-level risk assessment. Samples of concrete, cinderblock, caulk, and other materials were collected as described in the RI report. Generally, either bulk material consisting of pulverized cores or an intact piece (caulk) of material was sampled. In situ, only the surfaces of the media would be available for direct contact by human receptors that might enter or use the site. It is anticipated that the material investigated would not adhere to receptor's skin or become inadvertently ingested as a result of hand-to-mouth contact, nor is it anticipated that the material would become airborne, as a result of either volatile or particulate emissions, where it might be inhaled. Therefore, the samples collected do not realistically represent potential exposure pathways to which receptors might be exposed, and, therefore, meaningful exposure point concentrations for the intact structures (as kept in their current state) from which baseline risk estimates, reflecting existing conditions, were not derived.

However, the samples were used to provide reasonable estimates of exposure point concentrations that might be encountered in the future if the buildings and structures were demolished, broken up, and the debris left on site using a screening-level risk assessment. Potential exposure pathways during demolition activities could include dermal contact with demolished concrete, cinderblock, caulk, and similar materials, and potential inhalation of pulverized concrete and cinderblock. General categories of potential future uses considered in the screening-level risk assessment included residential, commercial/industrial, and recreational. Default, generic exposure scenarios were considered in the risk evaluation as the potential future use of the site is uncertain at this time.

Data were evaluated and COPCs were selected based on Risk-Based Screening Levels for Residential and Industrial Soil from EPA's Regional Screening Tables from May 2013 (EPA 2013a). Screening levels corresponding to target cancer risks (TCR) threshold of 1E-6 and non-cancer target hazard quotient (THQ) threshold of 0.1 and 1.0 were also considered. Contaminant concentrations were also compared with Removal Management Screening Levels (EPA 2012) corresponding to a TCR of 1E-4 and a THQ of 3 for residential receptors. Removal Management Screening Levels are considered when determining whether a Removal Action may be warranted. The Removal Management Screening Levels used were calculated from the residential soil screening levels given in the May

2013 Regional Screening Tables with suitable adjustments to TCR (1E-4) and THQ (3.0).

1.4.2 Results of Screening-Level Risk Assessment

Potential risks and hazards to receptor populations were not calculated as part of the screening risk assessment because the available data was not suitable for that purpose for the reasons discussed above. A screening-level risk assessment was performed to identify COPCs. The screening levels used in the assessment are considered threshold values and concentrations below these values are of no concern from a regulatory perspective. Results of the Screening-Level Risk Assessment are provided in Tables 5-1 through 5-3 of the RI report, and a summary of the screening-level risk assessment-identified COPCs is provided for each area of interest as follows.

1.4.2.1 P2 Area

R-47

One of the concrete slab samples from Building R-47 (R47-CON-01), as well as its duplicate sample (R47-CON-R7), exceeded Residential Screening Levels (SLs) for perchlorate, arsenic, cobalt, iron, manganese, 4,4'-DDE, gamma-BHC (Lindane), and gamma-Chlordane. These samples also exceeded Removal Management SLs for several PCBs and Dieldrin. The second concrete sample (R47-CON-02) and sample collected from the cinderblock wall exceeded Industrial SLs for several PCBs. The cinderblock sample also exceeded Removal Management SLs for arsenic, lead, and manganese.

Paint Locker

Industrial SLs were exceeded for arsenic in the concrete slab, benzo(a)pyrene in the cinderblock wall, and PCBs in the caulk collected from the building. There were also a number of exceedances of Residential SLs for arsenic, cadmium, cobalt, iron, manganese, and PAHs.

Acid Oxidizer Storage Tank

Residential SLs were exceeded in the concrete slab samples for arsenic, cobalt, iron, and manganese.

R-34

Industrial SLs were exceeded for antimony in the duplicate slab sample (R34-CON-R6), arsenic for all slab samples, and iron for the initial slab sample (R34-CON-01). In addition, residential SLs were exceeded for cobalt, lead, manganese, mercury, and PCBs in both the slab samples as well as the sample taken from the cinderblock wall.

1.4.2.2 South Stand Area

Test Stand 12 (S-12)
The Removal Management and Industrial SLs for Aroclor 1254 were exceeded in concrete slab (Sample S12-CON-02) and in the caulk sample collected from the doorframe of Test Stand 12. Residential SLs for aluminum, arsenic, cobalt, iron, and manganese were also exceeded in the concrete slab samples.

S-46
Building S-46 concrete slab samples showed exceedances for the Removal Management SL for Aroclor 1254. Additionally, the Residential SL for Aroclor 1254 was exceeded for the cinderblock wall sample and the caulk sample collected from the doorframe. The Industrial SL for arsenic was exceeded in the initial concrete slab sample (S47-CON-01) and the cinderblock wall sample; mercury also exceeded Industrial SL in the cinderblock sample. Metals that were observed above the Residential SL in the concrete slab included aluminum, cobalt, iron, and manganese; cobalt also exceeded the Residential SL for the cinderblock wall sample collected.

Test Stand 11(S-11)
Industrial SLs were exceeded for arsenic in the initial concrete slab sample (S11-CON-01), as well as its duplicate (S11-CON-R4). Residential SLs were exceeded for aluminum, arsenic, cobalt, iron, and manganese in the concrete slab, and arsenic, cobalt, and iron for the cinderblock sample collected from the test stand wall.

Test Stand 37 (S-37)
Industrial SLs were exceeded for arsenic in the initial concrete slab sample (S37-CON-01) and its duplicate sample (S37-CON-R5), as well as in the cinderblock sample collected from the wall of the test stand. Residential SLs were exceeded for aluminum, arsenic, cobalt, iron, manganese, and nickel for both the slab and cinderblock wall samples.

S-48
Building S-48 contained concentrations of aluminum, arsenic, cobalt, iron, and manganese that exceeded the Residential SLs in the samples collected from the concrete slab.

T-50
Building T-50 contained concentrations of aluminum, arsenic, cobalt, iron, manganese, benzo(a)anthracene, and Aroclor 1254 that exceeded the Residential SLs in samples collected from the concrete slab.

S-49
The Industrial SL for arsenic was exceeded in the sample collected from the cinderblock wall. Residential SLs were exceeded for arsenic, cobalt, iron, and manganese for both the concrete slab and cinderblock wall samples.

1.4.2.3 East Stand Area

Test Stand 2
Residential SLs were exceeded for arsenic, cobalt, iron, and manganese, as well as Aroclor 1254, in the concrete slab samples collected at Test Stand 2.

R-33
The sample at building R-33 contained an exceedance of the Residential SL for cobalt.

R-29
The Industrial SL for mercury and the Residential SLs for aluminum, arsenic, iron, and manganese were exceeded in the sample collected from the concrete slab floor.

R-21
The Removal Management SL for Aroclor 1254 was exceeded in one of the concrete slab floor samples, R21-CON-01, collected at Building R-21. The Industrial SL for arsenic was also exceeded in two of the concrete slab samples as well as the cinderblock sample. Residential SLs for arsenic, cadmium, cobalt, iron, lead, manganese, nickel, benzo(a)anthracene, and benzo(b)fluoranthene were exceeded in slab samples; cobalt and lead also exceeded Residential SLs in the cinderblock samples.

Test Stand 3
Aluminum, arsenic, iron, and manganese exceeded Residential SLs for the samples collected from the concrete slabs at Test Stand 3.

R-51
The Industrial SLs for arsenic and lead and the Residential SLs for cobalt and manganese were exceeded in the concrete slab samples collected at Building R-51.

Test Stand 4
The Industrial SLs for arsenic, lead, and Aroclor 1260 were exceeded in the concrete slab at Test Stand 4. Arsenic also exceeded the Industrial SL in the cinderblock sample collected from the wall of the test stand. Residential SLs for perchlorate, aluminum, arsenic, cobalt, iron, and manganese were exceeded in the concrete slab sample, while cobalt, iron, and manganese exceeded the Residential SLs in the cinderblock sample.

Scrubber
The concrete slab sample collected from the Scrubber structure contained arsenic, lead, and Aroclor 1260 that exceeded Industrial SLs, and aluminum, arsenic, cobalt, iron, lead, and manganese that exceeded Residential SLs.

Water Cooling Tower
The concrete sample collected from the Water Cooling Tower contained exceedances of the Residential SLs for aluminum, arsenic, iron, and manganese.

Condenser and Hot Well
Residential SLs for aluminum, arsenic, iron, and manganese were exceeded in the samples collected from the Condenser and Hot Well concrete slabs.

Agitator and Effluent Treatment Basin
Residential SLs for aluminum, arsenic, iron, manganese, and benzo(a)pyrene were exceeded in the samples collected from the concrete slabs within the Agitator and Effluent Treatment Basins.

1.4.3 Uncertainties
There are a number of uncertainties that affect the screening-level risk assessment process. Most uncertainties arise from lack of screening levels of several chemicals because they lack quantitative toxicity values. In these cases, screening levels for the parent compound or a very closely related compound were used as surrogates. Additionally, a number of chemicals were not detected at detection limit concentrations, which were actually higher than their risk-based screening level (RBSL). It is possible that some of these chemicals could be present at some concentration between zero and their detection limits, and, if present at undetected concentrations greater than the RBSL, they could present an undetected risk or hazard.

Since contact with potentially contaminated surfaces of various structures and materials is the primary exposure pathway of concern for OU3, the lack of EPA risk assessment guidance or algorithms for assessing contaminant intake and human health risk from contact with building surfaces should be considered another significant source of uncertainty.

1.4.4 ACM and LBP Potential Exposure Scenarios
Since the site is presently unused, the only human exposures likely to occur under existing conditions are exposures of site trespassers. Since the ACMs are in poor condition, exposure to asbestos could result from direct contact with these materials followed by hand-to-mouth contact, resulting in incidental ingestion. If friable materials are disturbed, asbestos fibers also could be released to the air where they could be inhaled. The LBP also is in poor condition. Potential lead exposure could most likely result from incidental ingestion of lead-containing dust and paint chips. Inhalation of airborne dust is also possible, but is less likely than incidental ingestion and would probably result in much smaller exposures.

The potential ACM and LBP exposures are not expected to be great enough to pose significant health risks. The site is not located immediately adjacent to residential areas so potential trespassers are not expected to include young children, who are particularly sensitive to lead exposure. If the buildings or structures containing asbestos and/or lead-based paint are to be reused or demolished in the future, the asbestos and lead contamination found by these surveys will need to be addressed in accordance with applicable regulations.

Table 1-1 Summary of Exceedances, Radiation Technology Superfund Site, Operable Unit 3, Rockaway Township, Morris County, New Jersey

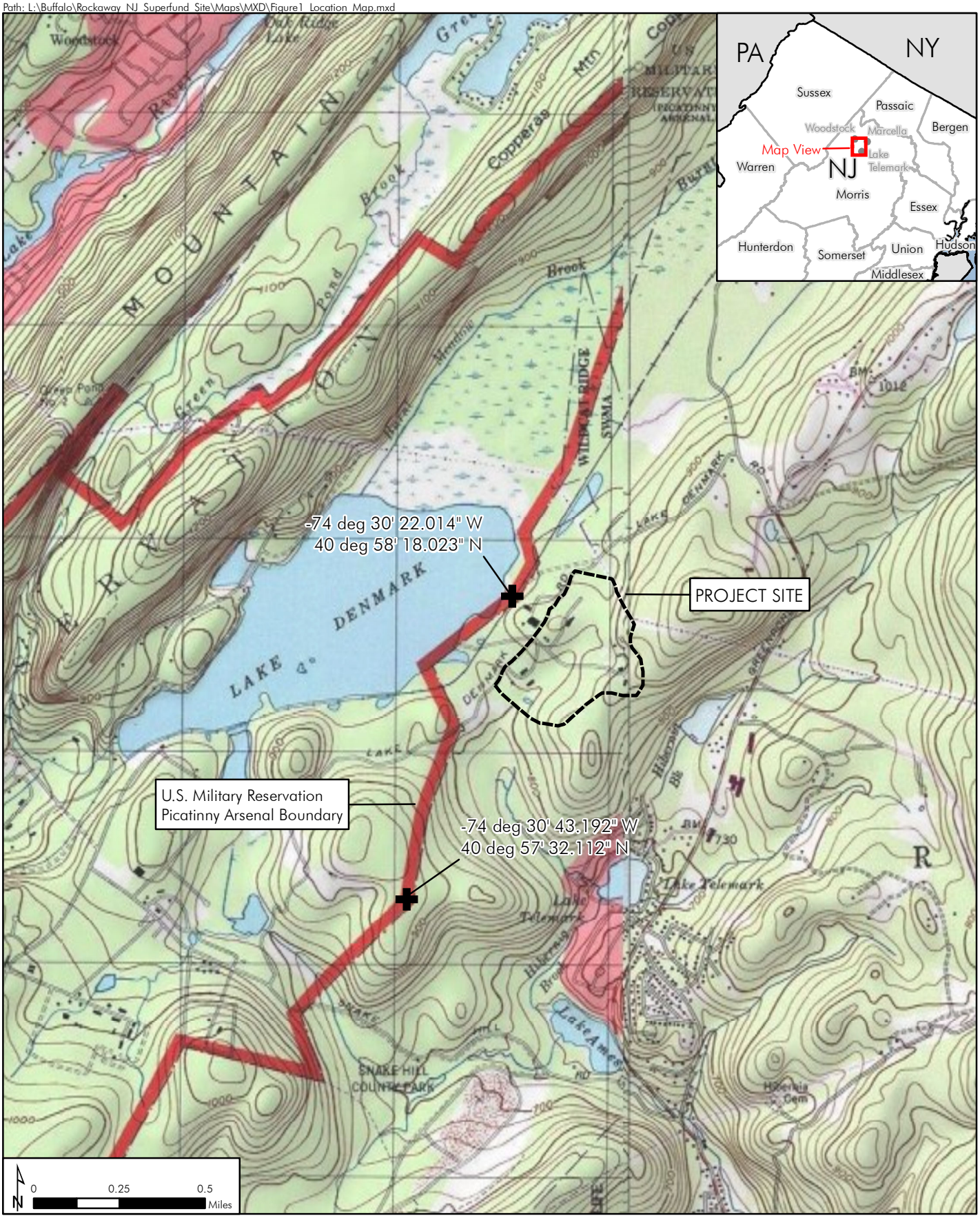
Building/Structure Material	Exceedances
P2 Area Exceedances	
R-47	
Concrete	Total PCBs Pesticides: 4,4-DDE, Dieldrin, gamma-BHC (Lindane), gamma-Chlordane
Cinderblock	TAL Metals: Arsenic, lead, manganese Total PCBs
Sub-slab Soil	Metals: Antimony, arsenic, cadmium, lead, manganese, zinc SVOCs: Benzo(a)pyrene, benzo(b)fluoranthene, pyrene
Paint Locker	
Cinderblock	SVOCs: Benzo(a)anthracene, Benzo(a)pyrene
Caulk	Total PCBs
R-34	
Concrete	TAL Metals: Antimony Total PCBs
Cinderblock	Total PCBs
Oil	Total PCBs
Sub-slab Soil	Metals: Antimony, arsenic, cadmium, lead, manganese, zinc SVOCs: Benzo(a)pyrene, benzo(b)fluoranthene, pyrene
South Stand Area Exceedances	
S-12	
Concrete	Total PCBs
Caulk	Total PCBs
S-46	
Concrete	Total PCBs
	Pesticides: Dieldrin, gamma-Chlordane
Cinderblock	Total PCBs
Caulk	Total PCBs
Sub-slab Soils	Metals: Antimony, arsenic, cadmium, chromium, lead, manganese, zinc SVOCs: Benzo(a)pyrene, benzo(b)fluoranthene, pyrene
East Stand Area Exceedances	
Test Stand (R-2)	
Concrete	Total PCBs
R-21	
Concrete	SVOCs: Benzo(a)anthracene Total PCBs Pesticides: Dieldrin
Cinderblock	Total PCBs
Caulk	Total PCBs
Sub-slab Soil	SVOCs: Benzo(a)pyrene

Table 1-1 Summary of Exceedances, Radiation Technology Superfund Site, Operable Unit 3, Rockaway Township, Morris County, New Jersey

Building/Structure Material	Exceedances
R-4	
Concrete	TAL Metals: Lead Total PCBs
No. 2 Sewage Treatment Plant	
Sludge	TAL Metals: Arsenic, Lead BNAs: Benzo(a)anthracene, benzo(a)pyrene
Condenser and Hotwell	
Concrete	Total PCBs
Cistern/Cistern Pump	
Water	TAL Metals: Chromium, Lead Total PCBs Pesticides: gamma-Chlordane

Key:
TAL = Target Analyte List
SVOC = semivolatile organic compound

Path: L:\Buffalo\Rockaway_NJ_Superfund_Site\Maps\MXD\Figure1_Location_Map.mxd



Project Site

Figure 1-1
Site Location Map
Radiation Technology, Inc. Superfund Site
Rockaway Township, New Jersey

R2-0005738

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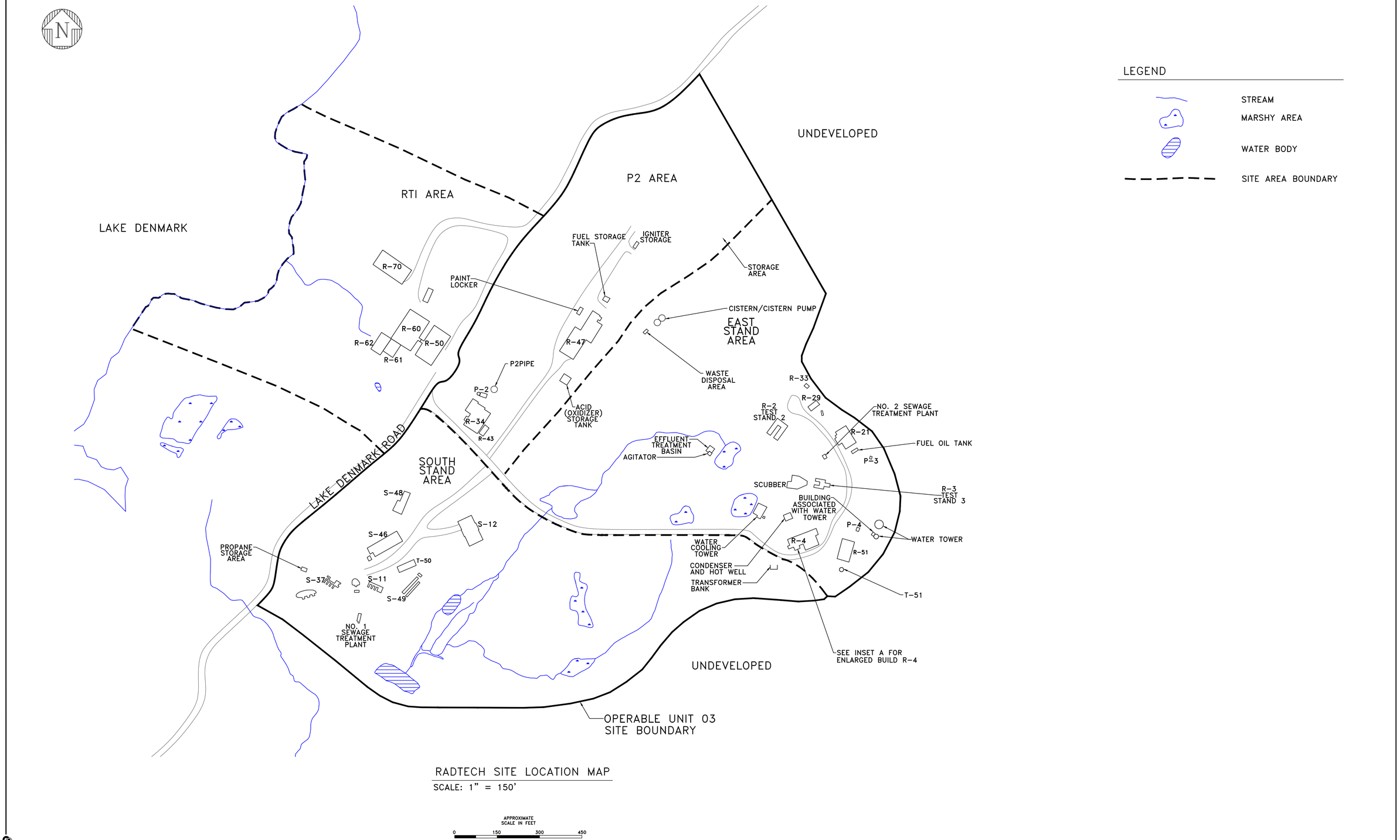

RADTECH SITE LOCATION MAP

SCALE: 1" = 150'

ecology and environment

FIGURE 1-2 RADTECH SITE LOCATION MAP
RADIATION TECHNOLOGY SUPERFUND SITE, OU3
ROCKAWAY TOWNSHIP, NEW JERSEY

R2-0005739

2 Identification and Screening of Technologies

2.1 Introduction

This section presents the first phase of the FFS process for the RTI Superfund site. The first step in developing remedial alternatives is to establish remedial action objectives (RAOs). Thus, for each medium of interest that is addressed within OU3, RAOs that will protect both human health and the environment are established. These objectives are typically based on COPCs, applicable or relevant and appropriate requirements (ARARs), and the findings of the human health risk evaluations. General response actions describing measures that will satisfy the RAOs are then developed. This includes estimating the areas or volumes to which the response actions may be applied. Finally, remedial technologies applicable to each action are identified and discussed with respect to their effectiveness and implementability. The applicable technologies are then assembled into medium-specific remedial alternatives in Section 3.

2.2 Remedial Action Objectives

2.2.1 Development of Remedial Action Objectives

Based on the Screening-Level Risk Assessment identification of exposure pathways, the following list of RAOs for OU3 was developed for protection of human health and the environment:

1. Prevent dermal contact with, and inhalation or ingestion of, PCBs from transformer oil, caulking compounds, and contaminated concrete and cinderblock;
2. Prevent dermal contact with, and ingestion of, contaminated water, sediment, and sludge in ASTs and sumps;
3. Prevent inhalation and ingestion of LBP from peeling and flaking paint; and
4. Prevent inhalation and ingestion of asbestos.

Remedies and development of groundwater RAOs are not part of OU3 and are not included as part of this FFS. Additionally, although sub-slab soil contamination has been detected in OU3, due to the nature of the alternatives, it is not anticipated that contaminated soil will be disturbed during remedial activities. Remediation of any structure (including a concrete slab) with sub-slab contamination above screening criteria will be limited to encapsulation or the scarification of the top surface and will not include full foundation demolition and removal.

2.2.2 ARARs and Other Policies and Guidance "To Be Considered"

As stated in EPA 1988, "Section 121(d)(2)(A) of CERCLA specifies that Superfund remedial actions meet any Federal standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs)." Further, "State ARARs must be met if they are more stringent than Federal requirements" (EPA 1988)[2].

Prior to implementing a remedial action, the federal, state, and local regulatory requirements that may be pertinent to such an action must be identified. Such requirements may guide or impact the selection of a remedial approach. In the course of conducting the FFS for the RTI site, ARARs as well as other "To Be Considered" criteria (TBCs) were identified from policy or guidance documents that may be pertinent to evaluating and implementing remedial options.

ARARs and TBC criteria are defined as follows:

- Applicable Requirements are cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site.
- Relevant and Appropriate Requirements are cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site and are well-suited to the particular site.
- To-Be-Considered Criteria consist of advisories, criteria, or guidance that were developed by EPA, other federal agencies, or states that may be useful in developing CERCLA remedies, and include non-promulgated guidance or advisories that are not legally binding and that do not have the status of potential ARARs. TBCs generally fall within three categories: health effects information with a high degree of credibility, technical

[2] Section 121 (d)(2)(A) of CERCLA states "With respect to any hazardous substance, pollutant or contaminant that will remain on-site, if – (i) any standard, requirement, criteria, or limitation under any Federal environmental law...; or (ii) any promulgated standard, requirement, or limitation under a State environmental or siting law that is more stringent than any Federal standard, requirement, criteria, or limitation ... and that has been identified ... in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened of such hazardous substance or pollutant or contaminant, the remedial action selected ... shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant or appropriate standard, requirement, criteria, or limitation."

information on how to perform or evaluate site investigations or response actions, and policy.

The EPA has divided ARARs into three categories: chemical-specific, location-specific, and action-specific. The three categories are described below:

- Chemical-Specific ARARs are usually health- or risk-based numerical values or methodologies, which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.
- Location-Specific ARARs apply to the geographical or physical location of the site. These requirements limit where and how the remedial action can occur.
- Action-Specific ARARs include performance, design, or other controls on the specific activities to be performed as part of the remedial action for a site.

ARARs and TBC Criteria for the RTI Superfund site, along with a brief description of each, are provided in Table 2-1.

As specified in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) under 40 CFR Section 300.430(f)(1)(i), six circumstances under which ARARs may be waived are as follows:

(1) The alternative is an interim measure and will become part of a total remedial action that will attain the applicable or relevant and appropriate federal or state requirement.

(2) Compliance with the requirement will result in greater risk to human health and the environment than other alternatives.

(3) Compliance with the requirement is technically impracticable from an engineering perspective.

(4) The alternative will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, or limitation through use of another method or approach.

(5) With respect to a state requirement, the state has not consistently applied, or demonstrated the intention to consistently apply, the promulgated requirement in similar circumstances at other remedial actions within the state.

(6) For Fund-financed response actions only, an alternative that attains the ARAR will not provide a balance between the need for protection of human health and the environment at the site and the availability of Fund monies to respond to other sites that may present a threat to human health and the environment.

2.2.2.1 Chemical-Specific ARARs and TBCs

Chemical-specific ARARs set health or risk-based concentration limits or ranges in various environmental media for specific hazardous substances. During the planning process, these requirements are used to establish site cleanup levels or to provide a basis for calculating cleanup levels for the media of interest. They are also used to define an acceptable level of discharge, for sites where discharge is necessary, which will determine the treatment and disposal requirements, and to assess the effectiveness of the remedial alternatives. During implementation of a remedial action, chemical-specific ARARs are used to define acceptable exposure levels.

A list of chemical-specific ARARs and TBCs for the RTI Superfund site is provided in Table 2-1, accompanied by a brief discussion of applicability to the site. For areas where building material waste will be removed, chemical-specific ARARs would include those that pertain to cleanup goals to determine that sufficient material has been removed to significant risks to the environment. Chemical-specific ARARs for the RTI Superfund site include solid waste management regulations (for ACM, LBP, and PCB-contaminated materials), Clean Water Act regulations, and the Toxic Substances Control Act for establishing PCB cleanup goals. Chemical-specific ARARs are summarized in Table 2-1.

2.2.2.2 Location-Specific ARARs and TBCs

Location-specific requirements set restrictions on the types of remedial activities that can be performed based on site-specific characteristics or location. Alternative remedial actions may be restricted or precluded based on federal and state siting laws for hazardous waste facilities, proximity to wetlands or floodplains, or proximity to man-made features, such as existing landfills, disposal areas, and historic buildings.

A list of location-specific ARARs and TBCs for the RTI Superfund site is provided in Table 2-1. Location-specific ARARs include the federal Endangered Species Act, as well as State of New Jersey surface water, floodplain, and wetlands requirements.

The federal Endangered Species Act (ESA) requires action to avoid jeopardizing the continued existence of listed threatened and endangered (T&E) species, or destroying or adversely modifying critical habitat. The ESA requires federal agencies to consult or confer with other agencies such as the United States Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration (NOAA), and the National Marine Fisheries Service. State requirements also require consultation with the NJDEP. A desktop assessment of potential T&E species was conducted using federal and state databases to identify species known to occur within Morris County, New Jersey, that may be encountered at the site. A site-specific T&E evaluation has not been performed but is recommended prior to commencement of work.

Lake Denmark to the west of the site is a major surface water feature in the vicinity of the site. Fed by Burnt Meadow Brook, Lake Denmark is a man-made lake that flows into Picatinny Lake and then into the Rockaway River (CRA 2010). Surface waters within the vicinity of the site are classified as RW2-TM(C1) (freshwater other than Pineland waters trout maintenance, category 1) (NJDEP 2012). Therefore, the water quality standards that apply to these water bodies are specified in New Jersey Administrative Code (NJAC) 7:9B, including standards for pH, dissolved oxygen, chemical constituents, and toxic substances. These requirements may be applicable to stormwater runoff generated in the course of the remedial action.

The site is located adjacent to wetland areas, and the New Jersey wetland ARARs typically apply to projects where remedial activities disturb wetlands as described in Title 7 of the NJAC: 7:7A Freshwater Wetlands Protection Act Rules. Additionally, based on reviews of the Federal Emergency Management Agency's (FEMA's) National Flood Insurance Program Flood Insurance Rate Map, the RTI Superfund site does not lie within the boundaries of the 100-year floodplain. The FEMA 100-year and 500-year floodplain maps (dated 9/18/86) were reviewed, and it was concluded that the site is located in Zone C (flood areas associated with minimal flood hazard, above the 500-year flood level) and in Zone D, which includes areas of undetermined but possible flood hazards (FEMA 2013). Therefore, the RTI Superfund site is not subject to Title 7 of the NJAC 7:14 and 7:13, and these codes are not considered as ARARs for the site. Location-specific ARARs are summarized in Table 2-1.

2.2.2.3 Action-Specific ARARs and TBCs

Action-specific requirements are triggered by the particular remedial activities that are selected to accomplish the cleanup. After remedial alternatives are developed, action-specific ARARs that specify performance levels, actions, or technologies, as well as specific levels for discharge of residual chemicals, provide a basis for assessing the feasibility and effectiveness of the remedies.

A list of action-specific ARARs and TBCs for the RTI Superfund site is provided in Table 2-1. Action-specific ARARs include requirements for disturbance, handling, removal, and transportation of ACM and PCB-contaminated material, recycling or beneficial use of concrete, stormwater management, and storage of fuels and oils on site. NJAC 7:27 Subsections 5, 13, 14, and 15 are applicable for control of air emissions (prohibits air pollution, lists requirements for vehicle emissions, and establishes ambient air quality standards for emissions of particulates, carbon monoxide, and lead) and require that standards of care be used during implementation (e.g., control of fugitive dust through spraying of water). Action-specific ARARs are summarized in Table 2-1.

Descriptions of federal and state-promulgated regulations and how they apply to OU3 as chemical-specific, location-specific, or action-specific ARARs are provided in greater detail below.

RCRA and Solid Waste Management

The Resource Conservation and Recovery Act (RCRA) provides guidelines for the control of hazardous waste from generation through transportation, treatment, storage, and disposal. The New Jersey Administrative Code adopts the federal regulations. RCRA guidelines pertain to the identification of hazardous waste (40 CFR 261), which is defined under NJAC 7:26. Those wastes that contain a RCRA-listed constituent or exhibit hazardous characteristics would have to be managed, treated, and disposed of as hazardous waste. Listed waste includes concrete and cinderblock with Dieldrin (Hazardous Waste Number P037), Lindane (U129), and Chlordane (U036). Activities involving hazardous waste must comply with New Jersey requirements listed in Table 2-1. Activities involving wastes determined to be non-hazardous must comply with New Jersey requirements for solid waste management.

Clean Water Act

The federal Clean Water Act (CWA), adopted under New Jersey water pollution laws, regulates the discharge of pollutants to surface waters of the state and may be applicable to remedial activities because of the proximity of the site to surface waters and wetlands and the potential discharge of surface runoff during the remedial action. Any discharge from the site that could impact surface water bodies would need to comply with chemical-specific discharge limits (as discussed above).

As noted previously, Section 7:9B of Title 7 of NJAC designates the surface waters adjacent to the site, including Lake Denmark, as a category FW2 classification, which means they are protected from any measurable change in existing water quality, unless otherwise permitted by the NJDEP. Therefore, the standards that apply to these water bodies are specified in NJAC 7:9B, including standards for pH, dissolved oxygen, chemical constituents, and toxic substances. For a remedial action to meet this ARAR, it must limit any surface runoff of contamination from the site that would lead to an exceedance of the water quality criteria for these water bodies. Stormwater management requirements are provided in NJAC 7:14A.

Clean Air Act

The federal Clean Air Act (CAA), adopted under New Jersey law, regulates the discharge of pollutants to the air of the state. The CAA may be applicable to remedial activities because of the disturbance of ACM identified at the site. The National Emission Standards for Hazardous Air Pollutants for Asbestos (NESHAP), under Section 112 of the Clean Air Act, establishes work practices to minimize the release of asbestos fibers during activities involving the processing, handling, and disposal of asbestos and asbestos-containing material when a building is being demolished or renovated. The requirements and standards are described in 40 CRF Part 61, Subpart M.

Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) addresses the manufacture, handling, and disposal of specific toxic substances, including PCBs. Because PCBs have been detected above the TSCA bulk remediation waste cleanup concentrations at the RTI Superfund site, TSCA requirements apply to actions addressing PCB-containing materials.

The ARARs and TBCs identified in Table 2-1 enter into the evaluation of remedial alternatives, discussed in Section 4 of this report. The list of ARARs and TBCs will be refined as a preferred alternative is selected, and final ARARs will be presented in the Record of Decision (ROD).

2.2.3 Cleanup Goals

The final step required for the development of RAOs is to establish cleanup goals based on chemical-specific ARARs, TBCs, and COPCs. The aim of remedial action objectives is to meet ARARs and eliminate exposure to contaminants of concern such that human health and the environment are adequately protected. This can be achieved by eliminating exposure pathways (which is discussed in the upcoming Section 2.3, General Response Actions) or reducing contaminant concentrations to levels that are accepted to be adequately protective of human health and the environment.

Cleanup concentrations were selected by review of state and federal laws, regulations, and guidance documents, as well as by evaluating risks identified in the screening-level risk assessment. Cleanup concentrations for identified COPCs are listed in Table 2-2. Remediation standards used in determining proper disposal for concrete and cinderblock and other associated solid wastes (i.e., sediment from ASTs) for buildings include the use of minimum residential direct contact and non-residential direct contact soil remediation standards (RDCSRS and Non-RDCSRS) as defined in NJAC 7:26D, which are based on human health-based criteria for the ingestion-dermal exposure pathways. Although these criteria are based on concentrations observed in soil, the RDCSRS are referred to in the NJDEP *Guidance for Recycling* (NJDEP 2010). The non-RDCSRS values were also used for additional evaluation in case the RDCSRS values were exceeded. The NJDEP remediation standards do not have criteria established for perchlorate; therefore, EPA Regional Screening Levels for Soil (Residential and Industrial; EPA 2013a, b) were selected as the cleanup goals for solid waste at the site.

NJAC 7:26 is the standard used for the solid waste regulations associated with the cleanup goals and disposal criteria that have been selected to remediate asbestos observed on site. NJAC 7:26 adopts the EPA NESHAP standards. According to NESHAP, any material containing more than 1% asbestos is classified as ACM (NESHAP; 40 CRF Part 61). Friable ACM is material which may be crumbled, pulverized, powdered, crushed, or exposed asbestos, which is capable of being released into the air by hand pressure. It is assumed that site material that has been identified as ACM during previous field investigations will not meet the

cleanup goals and will be required to be remediated. In New Jersey, ACM is broken down into three categories, as defined in NJAC 7:26, that determine the disposal method: Category I nonfriable asbestos-containing material, Category II nonfriable asbestos-containing material, and regulated asbestos-containing material (RACM). Remediation and disposal methods for ACM are based on this classification.

The NJDEP Surface Water Quality Standards, Surface Water Quality for Toxic Substances (Freshwater Classification 2 [FW2]) Criteria) were selected as the cleanup goals for water and liquids remaining in ASTs, the sewage treatment plant basins, cisterns, and so forth, located on site. The cleanup objectives for the RTI OU3 site are presented in Table 2-2.

2.3 General Response Actions

Based on the information derived from previous investigations, general response actions are identified for each medium of interest. General response actions can be considered conceptual alternatives for each medium of interest that will satisfy the remedial action objectives. The "no-action" alternative is included as a general response action for each medium of interest to serve as a basis for comparison with other potential response actions.

2.3.1 Contaminated Structures

The general response actions for contaminated solid wastes identified in this section, including concrete, cinderblock, caulk, sediment, and so forth, address the pathways of direct contact (e.g., inhalation, dermal adsorption, and ingestion). Containment (capping and or sealing of this material) would prevent direct contact with potential receptors. Demolition, treatment, and disposal would remove, immobilize, or destroy waste material and contaminants and eliminate the potential for direct contact with the wastes in the long term. The no-action alternative would leave wastes in their present condition.

2.3.2 Asbestos

The general response actions for ACM identified in this section address the pathways of direct contact (e.g., inhalation and ingestion). Collection, treatment, and disposal would remove, reduce mobility, or encapsulate ACM material and eliminate potential receptor direct contact with contaminated waste. Encapsulation has not been considered further because it is not a permanent remedy. The no-action alternative would leave the ACM in its present condition.

2.3.3 Lead-Based Paint

The general response actions for LBP identified in this section address the pathways of direct contact (e.g., inhalation and ingestion). Containment (sealing of LBP) would prevent direct contact with potential receptors. Demolition, treatment, and disposal would remove, reduce mobility, or encapsulate LBP material and eliminate direct contact with contaminated waste. The no-action alternative would leave LBP in its present condition.

2.3.4 Tank Contents

The general response actions for tank contents remaining on site in ASTs, the cistern, and the basins in the water treatment systems address the pathways of inhalation, dermal adsorption, and ingestion. Removal, possible pretreatment, and disposal would eliminate direct contact with contaminated waste on site. The no-action alternative would leave the contaminated surface water in its present condition.

2.3.5 Surface Area and Volume Estimation of Contaminated Media

The following section discusses contaminated media that present current and future sources of contaminant exposure to human receptors. Note that for the purpose of the OU3 FFS Report, only contaminant sources affecting OU3 will be evaluated further. Specifically, the following contaminated media are discussed and will be addressed:

- Concrete, cinderblock, and other PCB-contaminated solid wastes associated with the structures;
- Oil, sludge, and water observed in ASTs, cisterns, and water treatment system basins;
- ACM; and
- LBP.

Volume estimates are presented in Tables 2-3 through 2-6.

2.4 Identification of Applicable Remedial Technologies

Applicable remedial technologies are identified below for each general response action. The section has been refined (focused) by retaining only those remedial technologies appropriate for the site, taking into account the following:

- Site conditions and characteristics that may affect implementability of the technology;
- Physical and chemical characteristics of contaminants that determine the effectiveness of various technologies; and
- Performance and operating reliability of the technology.

2.4.1 Contaminated Structures

Existing site information was reviewed to determine future probable property use. The site consists of multiple structures (slabs, test stands, and so forth) and buildings constructed between the late 1940s through the 1960s that were used to support rocket engine and component testing programs. The majority of the buildings were constructed with concrete slab foundations and cinderblock or concrete walls. Historical use has resulted in COPCs that include ACM, LBP, PCBs, metals, PAHs, and pesticides; however, ACM, LBP, and PCBs are the primary COPCs used in the evaluation of technologies for remediation. Contami-

nant concentrations of metals, PAHs, and pesticides were used as secondary criteria to evaluate if the solid waste (i.e., concrete and cinderblocks) could be recycled for those buildings selected for demolition that do not have PCB disposal restrictions. The most likely future use of the property is as open space; however, it is possible that some of the existing buildings that remain in sound condition will be reused. The evaluation presented in this FFS assumes that the site would be accessible to people working within the remaining structures.

The first step in the development of remedial alternatives was to screen available, viable remedial technologies that could be applied to the site. A limited list of potential remedial technologies was quickly narrowed down, based on the contamination that was observed above acceptable risk levels and the nature of the media (e.g., concrete, cinderblock, and caulk).

2.4.1.1 Asbestos

Asbestos abatement will be a common remedial action for the alternatives screened, excluding the no-action alternative. Prior to any remedial activity in those buildings identified as containing ACM, abatement of asbestos will be required per NESHAP. Methods used to remove ACM in each of the buildings will be selected based on the particular type of ACM observed (i.e., friable and non-friable) and the material requiring removal (i.e., tiles, insulation, caulking, sealants, glazing, mastic). In some cases the material may be repaired and remain in place with no further exposure threat. Asbestos abatement work will be performed in accordance with applicable federal, state, and local rules and regulations. A certified asbestos firm licensed by the State of New Jersey will be procured to perform the abatement. Alternatives for addressing ACM on building materials at the RTI Superfund site include:

1. No-action;
2. Encapsulation or repair of ACM; and
3. Removal and disposal of ACM.

2.4.1.2 Lead-Based Paint

Removal of LBP prior to demolition activities is not required in the state of New Jersey. Therefore, alternatives for lead abatement will only be assessed if structures are to remain on site. The contractor performing this work will comply with the Occupational Safety and Health Administration (OSHA) Worker Protection Rule and with the EPA RCRA requirements that govern the disposal of lead-contaminated waste. It is assumed that LBP will be below the TCLP concentration limit of 5 mg/L for hazardous wastes and can therefore be managed as a construction and demolition waste and recycled or disposed of as a solid waste. However, if testing prior to abatement or demolition indicates that LBP is in excess of this criterion, then it will be classified as a hazardous material and require disposal in a RCRA waste facility. Alternatives for addressing LBP on building materials at the RTI Superfund site include:

1. No-action;
2. Encapsulation of LBP; and
3. Removal and disposal of LBP.

2.4.1.3 PCBs

Treatment and disposal options for PCB-contaminated material are governed by the type of material that is contaminated and the concentration of PCBs in the material. The EPA, in its guidance document entitled *Polychlorinated Biphenyl (PCB) Site Revitalization Guidance Under the Toxic Substances Control Act* (2005), has indicated that potential remedies for addressing contamination of building materials include chemical cleaning (decontamination), encapsulation, and removal and disposal.

During an evaluation of the technologies listed above, it was found that concrete surface cleaning may not be the most effective long-term solution for PCBs in concrete. It has been found through trial cleaning methods that cleaning removes only a portion of the contamination from the first inch of material (Guo 2012). Therefore, during the screening process, chemical cleaning was combined with encapsulation to reduce the potential for bleed-back of PCB contamination to the surface of the concrete.

Required remedial actions for PCB contamination are prescribed in 40 CFR (40 CFR §761.3) as established by the EPA TSCA regulations based on the PCB concentrations found in solid wastes. 40 CFR §761 may trigger specific remediation methods that will need to be implemented at specific buildings at the RTI Superfund site depending on the PCB concentrations. TSCA stipulates a range of self-implementing cleanup levels based upon potential future high and low occupancy scenarios for the building that are defined in 40 CFR §761.61(a)4. Low occupancy is defined as a building that will not exceed being occupied more than an average of 6.7 hours per week. These self-implementing remediation scenarios fall within PCB soil contamination ranges from 1 to 100 parts per million (ppm).

It should be noted that materials that were manufactured with PCBs (i.e., caulk, sealants, adhesives, some plastics, paints, and varnishes) and that contain concentrations at levels equal to or greater than 50 ppm are subject to the disposal requirements for PCB Bulk Product Waste under 40 CFR §761.2. Additionally, materials that contain PCBs ≥100 ppm as a result of a release from a PCB Bulk Product Waste (i.e., the adjacent soil, concrete slabs, cinderblock) are subject to the regulations for the PCB Remediation Waste under 40 CFR §761.1.

TSCA does not regulate PCBs at concentrations less than 1 ppm. However, remediation triggers have been enacted under the current New Jersey Site Remediation Program Policy. Although no specific concentrations have been established for concrete, the state's RDCSRS and Non-RDCSRS soil criteria are deemed applicable for the solid waste materials. Under the New Jersey Site

Remediation Program Policy, PCBs detected below 0.2 ppm would not require remediation. In a residential use scenario, PCBs above 0.2 ppm and less than 1 ppm require institutional (i.e., deed notice) and engineering controls (i.e., encapsulation). In a non-residential or restricted use scenario, PCBs found above 0.2 ppm require a deed notice, and, when above 1 ppm, institutional and engineering controls are mandatory (NJDEP 2013a). In the evaluation of the alternatives in Section 3, it will be assumed that the future use of the site will have a high-occupancy rate for structures that can be reused for production, maintenance, or administrative purposes (i.e., buildings R-47, R-37, S-46, R-51, and the like), and low occupancy for those structures that are considered unsuitable for production, maintenance, or administrative purposes (i.e., Paint Locker, test stands, pump houses, sewage treatment plants, concrete pads, and so on). For the purposes of evaluating cleanup goals under TSCA regulations, buildings identified as having no future use were evaluated using goals set for low-occupancy rate structures. Table 2-2 summarizes the cleanup objectives that will be met for OU3.

Alternatives for addressing PCBs contained within building materials at the RTI Superfund site include:

1. No-action;
2. Decontamination followed by encapsulation of PCBs; and
3. Removal and off-site disposal of PCBs.

2.4.2 Sediment, Oil, and Water

Sediment, oil, and water collection, containerization, and treatment and disposal using standard remedial practices will be common in all alternatives, except the no-action alternative. All federal, state, and local regulations associated with the disposal of each of the media will be observed.

Table 2-1 Summary of ARARs and TBC Criteria
Focused Feasibility Study Report, Operable Unit 3,
Radiation Technology, Inc., Rockaway Township, Morris County, New Jersey

Federal and New Jersey PCB Chemical-Specific ARARs						
Regulation	**Requirement**	**Prerequisite**	**Citation**	**Alternative**	**ARAR Determination**	**Comment**
Air	This regulation prohibits air pollution, lists requirements for vehicle emissions, and establishes ambient air quality standards for the emissions of particulates, carbon monoxide, and lead.	Any process emitting one of the listed pollutants or contributing to air pollution.	NJAC 7:27-5, 13, 14, 15		Applicable	Substantive requirements are applicable for on-site activities that may contribute to air pollution.
Surface water	This regulation governs surface water quality criteria with qualitative rules for specific NJ waterbodies/rivers and waterbody types. These rules establish minimum water quality requirements for all surface waters of the state.	Conducting a response action that includes a discharge to surface water.	NJAC 7:9B		Applicable	Applicable for off-site discharges of water to surface water; substantive requirements are applicable for on-site discharges
Soil	This regulation establishes direct contact soil remediation standards for soils.	Cleanup standard for the ingestion/dermal exposure pathway for use in remediation of soil impacts.	Soil Remediation Standards. NJAC 7:26D Remediation Standards		Applicable	The ingestion/dermal exposure pathway is applicable under CERCLA (except the standard for lead, and except when the future use of a site will be limited to recreation) to the extent it is more stringent than federal standards. The SRS for the inhalation pathway and methodologies for determining impact-to-groundwater soil remediation goals are not ARARs. To be applicable, a standard must be of general applicability and legally enforceable.
Asbestos	This establishes the definition for regulated asbestos-containing materials.	Presence of asbestos-containing material over threshold values.	40 CFR 61.141		Applicable	Substantive requirements are applicable if any asbestos-containing materials are on site.
PCBs	This establishes the definition for materials containing regulated PCBs.	Materials containing PCBs greater than 50 ppm.	40 CFR 761.1		Applicable	Substantive requirements are applicable if PCBs are on site.

Table 2-1 Summary of ARARs and TBC Criteria
Focused Feasibility Study Report, Operable Unit 3,
Radiation Technology, Inc., Rockaway Township, Morris County, New Jersey

Federal and New Jersey Location-Specific ARARs

Location	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Floodplain	Limitations for activities performed within floodplains.	Activities within floodplains.	Flood Hazard Area Control. NJAC 7:14		TBC	No work should be performed in floodplains during remediation.
Wetland	Permits are required for any activities disturbing wetlands.	Activities within wetlands.	Freshwater Wetlands Protection. NJAC 7:7A		TBC	No wetlands should be disturbed during remediation.
Migratory flyway	Protects almost all species of native birds in the United States from unregulated taking.	Presence of migratory birds.	*Migratory Bird Treaty Act*, 16 USC 703		TBC	If migratory birds, their nests, or eggs are identified at the site, operations will not destroy the birds, nests, or eggs.
Endangered species	Protection of threatened and endangered species.	Presence of threatened or endangered species.	Endangered and Non-Game Species. NJAC 23:2A-1		TBC	Endangered or threatened species have not been identified at the site.
Endangered plants	Protection of threatened and endangered plant species.	Presence of threatened or endangered plant species.	Endangered Plant Species List. NJAC 7:5C		TBC	Endangered or threatened plant species have not been identified at the site.
Historic preservation	Preservation of historic and archaeological artifacts, buildings, etc.	Presence of historic features.	40 CFR 6301		TBC	

Table 2-1 Summary of ARARs and TBC Criteria
Focused Feasibility Study Report, Operable Unit 3,
Radiation Technology, Inc., Rockaway Township, Morris County, New Jersey

Federal and New Jersey Action-Specific ARARs

Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Asbestos abatement	The disposal requirements for major sources of ACM include restrictions on visible emissions, provisions for wetting the ACM, packaging, sealing, labeling, record keeping, and reporting.	Disturbance, handling, or removal of ACM.	40 CFR 61.145 and 150		Applicable	Substantive requirements are applicable if any asbestos-containing materials are removed or handled.
Transporting asbestos	Set forth transporter standards for shipment of ACM.	Off-site transportation of asbestos	NJAC 7:26-3.5(d)		Applicable	Substantive requirements are applicable if asbestos is transported.
PCB abatement	These regulations establish the requirements for storage, handling, and disposal of materials containing PCBs greater than 50 ppm that may be generated during remedial actions.	Generation of PCB remediation waste.	40 CFR 761		Applicable	Substantive requirements are applicable if any PCB-containing materials are removed or handled.
Construction and demolition debris	Requirement for sites within the NJ DEP Site Remediation Program to sample concrete and caulk when the materials are designated for recycling or beneficial use.	Recycling or beneficial use of concrete.	Guidance for Characterization of Concrete and Clean Material Certification for Recycling.		TBC	
Managing storm-water runoff from land-disturbing activities	Requires that best management practices be employed to prevent stormwater pollution caused by erosion and sedimentation as well as any other potential pollutants during construction activities.	Any use of the land encompassing an area of 1 acre or more that results in a change in the natural cover or topography and that may cause or contribute to sedimentation.	NJAC 7:14A (substantive requirements only)		Relevant and Appropriate	Since this is an on-site CERCLA action, coverage under the permit is not required. The substantive requirements of the permit will be complied with for on-site actions.
Storage of fuels and oils (petroleum and non-petroleum) on site	If storage capacity limits are exceeded, a Spill Prevention, Control, and Countermeasure Plan must be prepared and implemented with pro-cedures, methods, equipment, and other requirements to prevent the dis-charge of oil into or upon the navi-gable waters of the United States.	Total on-site storage capacity exceeding 1,320 gallons in containers that are 55 gallons or larger in size.	40 CFR 112		Relevant and Appropriate	It is anticipated that fuels may be stored on site during construction but since this is an on-site CERCLA action, a Spill Prevention, Control, and Countermeasure (SPCC) Plan does not need to be prepared. Containers include oil and fuel reservoirs in equipment.

Table 2-2 Federal and State COPC Cleanup Criteria

Material	Definition	Site Material	Remedial Option	Criteria
PCB Bulk Product Waste 40 CFR §761.62	Waste derived from manufactured products (i.e., caulks, sealants, paints, etc.) at concentrations greater than 50 ppm at the time of disposal	Caulk around door frame and windows	Performance-based disposal by landfill, incineration, or decontamination until cleanup goals are met	>50 ppm
			Risk-based disposal approval by EPA	>50 ppm
PCB Remediation Waste 40 CFR §761.61	Waste containing PCBs as a result of a spill, release, or other unauthorized disposal	Concrete and cinderblock	**High-Occupancy Future Use**	
			Encapsulation and Institutional Controls	>0.2 ppm* to ≤ 10 ppm
			Disposal	>10 ppm
			Low-Occupancy Future Use	
			Institutional Controls	>0.2 ppm* to ≤ 50 ppm (if secured by fence and warning signs)
			Encapsulation and Institutional Controls	>0.2 ppm to ≤ 100 ppm (if fully encapsulated)
			Disposal	>50 ppm (if a fence is used to limit exposure) >100 ppm (if encapsu-lation is used to limit exposure)
Benzo(a)pyrene NJAC 7:26D		Concrete and sub-slab soils	Remediation or Disposal	0.2 mg/kg
Chromium NJAC 7:9B		Water	Remediation or Disposal	0.015 mg/L (SWQC-FW2 Acute)
				0.01 mg/L (SWQC-FW2 Chronic)
Lead NJAC 7:9B		Water	Remediation or Disposal	0.038 mg/L (SWQC-FW2 Acute
				0.0054mg/L (SWQC-FW2 Chronic)
PCBs NJAC 7:9B		Water	Remediation or Disposal	No SWQC-FW2 Acute Criteria Available
				0.000014 mg/L (SWQC-FW2 Chronic)
Lead 40 CFR §745		Paint	Remediation or Disposal	1 mg/cm^2 or 0.5% by weight of sample**

* The 0.2-ppm bulk sample remediation acceptance criterion is listed as the New Jersey Residential Soil Remediation Standard for PCBs. The state Non-Residential SRS threshold is 1 ppm. EPA TSCA regulations do not define PCB criteria below 1 ppm; federal cleanup limits for porous surfaces, such as concrete, establish bulk sample remediation acceptance criteria ≤ 25 ppm for low-occupancy uses and 1 ppm for high occupancy.

** Construction Demolition debris with suspected LBP shall be tested by TCLP prior to disposal. If the analytical results indicate lead in concentrations above 5 mg/L, then the debris will be considered hazardous in nature and disposed of in a licensed facility.

Key:
mg/kg = Milligrams per kilogram.

Table 2-3 Surface Area and Volume Estimate of Contaminated Media

Area Name	Structure Surface Area (square feet)	Assumed Concrete Thickness (feet)	Estimated Contaminated Concrete Waste Volume (tons)	Structure Perimeter (feet)	Assumed Structure Height (feet)	Estimated Contaminated Cinderblock Waste Volume (tons)	Estimated Quantity of Contaminated Caulk (linear feet)
P-2 Area							
R-47	10,257	0.5	372	513	16	325	--
Paint Locker	328	--	--	100	12	48	38
R-34	6,419	0.5	233	878	16	556	--
South Stand Area							
Test Stand 12 (S-12)	5,204	30	7,615	--	--	--	34
S-46	4,949	0.5	180	490	16	309	362
East Stand Area							
Test Stand 2 (R2)*	2,730	20	3,295	--	--	--	--
R-21	3,515	0.5	127	287	16	181	118
Test Stand 4 (R4)	5,104	0.5	185	--	--	--	--
Condenser and Hotwell*	678	0.5	112	--	--	--	--

Notes:
Concrete estimate assumes a unit weight of 145 lb/cubic foot.
Cinderblock estimate assumes a unit weight of 95 lb/cubic foot.
*Although the analytical results indicate that the structure exceeded residential screening criteria for PCBs, this structure is below commercial/industrial screening criteria and, therefore, will not be evaluated further due to its no future value designation.

Table 2-4 Estimate of ACM Contaminated Media

Area Name	Material Description	Unit	Estimated Quantity
P-2 Area			
R-47	Pipe Insulation	LF	45
	Gaskets	SF	15
	Tar	SF	100
	Vent Caulking	LF	20
	Floor Tile	SF	280
	Mastic Associated with Floor Tile		
	Floor Tile	SF	2,050
	Mastic Associated with Floor Tile		
	Pipe Fitting Insulation	Each	20
Igniter Storage Area	Fabric Cushion	SF	3
Pump House 2 (P-2)*	Transite Pipe	LF	8
R-34	Floor Tile	SF	800
	Mastic Associated with Floor Tile		
South Stand Area			
Test Stand 12 (S-12)	Door Caulking	LF	18
	Pipe Insulation and associated canvas	LF	290
S-46	Floor Tile	SF	550
	Mastic Associated with Floor Tile		
	Window Caulking	LF	130
	Flashing	SF	75
	Pipe Insulation	LF	300
	Pipe Fitting Insulation	Each	20
Test Stand 11 (S-11)*	Caulking	LF	120
	Tar Mastic	SF	20
Test Stand 37 (S-37)*	Tar	SF	80
	Caulking	LF	150
	Floor Tile	SF	200
	Transite		
	Roofing Tar Paper	SF	1,300

Table 2-4 Estimate of ACM Contaminated Media

Area Name	Material Description	Unit	Estimated Quantity
East Stand Area			
R-29	Floor Tile	SF	840
	Mastic Associated with Floor Tile		
R-21	Joint Material	LF	15
	Window Caulking	LF	120
	Tar Sealant	SF	3,500
	Tar Sealant	LF	500
	Floor Tile	SF	225
	Mastic Associated with Floor Tile		
	Floor Tile	SF	90
	Floor Tile	SF	800
R-51	Window Glazing	LF	120
	Caulking	LF	40
	Pipe Insulation	LF	20
Test Stand 4 (R-4)	Pipe Insulation	LF	10
	Pipe Fitting Insulation	Each	102
	Floor Tile	SF	2,050
	Mastic Associated with Floor Tile		
Water Tower*	Tar Sealant	SF	8
Building Associated with Water Tower*	Tar Sealant	SF	10
Water Cooling Tower *	Tar	SF	4.5

* Although the structure contains ACM, COC concentrations are below the commercial/industrial screening criteria; therefore, no remedial action under CERCLA is required. Since this structure was identified as having no future reuse value and remedial actions are not required, the structure has not been further evaluated.

Table 2-5 Estimate of LBP-Contaminated Media

Area Name	Location Where LBP Identified	Estimated Surface Area Containing LBP (square feet)
P-2 Area		
R-47	Interior Door	24
Paint Locker	Exterior Door Surface	24
Igniter Storage Area	Exterior Door Surface	24
R-43*	Surface of Exterior of Shed	720
	Exterior Door Surface	24
R-34	Door Jamb	1
South Stand Area		
S-46	Roll-up Door Frame	2.5
East Stand Area		
Test Stand 2 (R2)*	Interior Door	24
R-33*	Door Jamb	1
R-21	Interior Door	24
Pump House 3 (P-3)*	Interior Door	24
Test Stand 3 (R-3)*	Wall	240
R-51	Interior Door	24
Test Stand 4 (R-4)	Interior Door	24
	Door Jamb	1
	Wall	720
Water Tower*	Exterior Surface of Water Tower Column	1,400
Building Associated with Water Tower*	Exterior Surface of Silo	220

* Although the structure contains LBP, COC concentrations are below the commercial/industrial screening criteria; therefore, no remedial action under CERCLA is required. Since this structure was identified as having no future reuse value and remedial actions are not required, the structure has not been further evaluated.

Table 2-6 Estimate of Contaminated Tank/Basin Contents

Area Name	Type of Material	Volume
P-2 Area		
R-34	Oil in Wall-Mounted Transformer	5.0 gallons
East Stand Area		
Cistern/Cistern Pump	Surface Water	1,280 gallons
No. 2 Sewage Treatment Plant	Sludge in Basin	2.3 cubic yards
	Water	1,421 gallons

3 Development of Remedial Alternatives

Currently, the RTI Superfund site OU3 area consists of 34 structures in the P-2 Area, East Stand Area, and South Stand Area. These buildings are unused and many are filled with debris and waste. Some of the buildings are also in a dilapidated state and cannot be salvaged or restored sufficiently for future use. Concrete, cinderblock, caulk, and sub-slab soil excavations and sampling have identified PCBs as COPCs. ACM and LBP have also been detected in many of the buildings and in the waste and debris located in the buildings. Several ASTs still remain on site; although many are empty, some were determined to hold contaminated liquid, sludge, and/or sediment. A cistern located in the East Stand Area that contains contaminated surface water will also be addressed under this FFS. Groundwater contamination and source soil contributing to groundwater contamination are not included as part of this FFS and fall under the OU1 and OU2 remedial actions.

The alternatives have been developed to mitigate potential threats posed by the RTI Superfund site contaminants associated with the structures. These alternatives were also developed based on federal and New Jersey State guidance as described in Section 2. This FFS has been streamlined for the RTI Superfund site and includes three alternatives, including the no-action alternative. Section 4 evaluates the alternatives individually and comparatively using the criteria established by the EPA. Table 3-1 summarizes the alternatives and identifies structures that are deemed unfit for reuse, those that may be reused based on their structural integrity and layout, and the assumed occupancy level of buildings that are determined fit for reuse. Structures deemed unfit for reuse by E & E have been assigned a "no future use" designation. The future reuse value designation for each of the Site structures was determined by evaluating both the current structural integrity (i.e., R-43, collapsed hut) and the type or past use of the structure (i.e., Test Stand 12 [S-12], no identifiable reuse).

None of these Risk-based Screening Levels addressed ecological risk. The lack of viable habitat and the lack of complete ecological species exposure pathways are the basis for concluding there is not significant ecological risk from buildings/structures comprising OU3 (and that the remedies would therefore be protective of ecological risk).

In 2007, a Phase IA cultural resources investigation conducted at the RTI property concluded that areas within the property were archaeologically sensitive for prehistoric and historic archaeological resources, and extant buildings and structures were potentially eligible for inclusion in the National Register of Historic Places (NRHP). As a result of these conclusions, Phase IB archaeological investigations were recommended for the archaeologically sensitive areas to determine whether any archaeological resources were present, and NRHP-eligibility evaluations were recommended for the existing buildings and structures (Woodhouse-Beyer et al. 2007). In 2013, the extant buildings and structures at the RTI property were evaluated for NRHP-eligibility concurrently with performance of the RI and were collectively recommended as NRHP-eligible as a historic district (Wheeler 2013). A letter was submitted by the EPA to the New Jersey State Historical Preservation Officer (SHPO) in December 12, 2013, to solicit comments and concurrence on the EPA's proposed NRHP-eligibility determination; however, a final determination on NRHP-eligibility of the proposed historical district has not been established.

If the New Jersey SHPO concurs with the NRHP-eligibility recommendation for the buildings and structures at the RTI property and the need for a Phase IB archeological investigation, as assumed in the RI report, an additional cost of approximately $100,000 will be required to support compliancy with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA) and its implementing regulations at 36 CFR Part 800. These costs include completion and submittal of an Architectural Survey form that would be used by the EPA and New Jersey SHPO to determine NRHP-eligibility of the historic district, as well as costs associated with a Phase 1B archaeological investigation. It was assumed for the basis of this FFS that the buildings and structures at the Site will be determined contributing elements of an NRHP-eligible historic district and Phase 1B archeological investigations would be necessary for those areas of the Site that are considered archaeologically sensitive. Therefore, costs for the Architectural Survey form and Phase 1B archeological investigations were incorporated into the final cost estimates for each of the action alternatives.

The costs for Section 106 compliance includes support for continued consultation on the potential effects of the FFS alternatives for the project on historic properties, with the New Jersey SHPO as needed. Because Section 106 consultation involves other parties, Section 106 consultation costs also cover support for consultation with federally recognized Indian tribes (typically done on a government-to-government basis), representatives of local governments with jurisdiction over the project's area of potential effects, other consulting parties that have a demonstrated interest in the project and/or historic properties, the public, and the Advisory Council on Historic Preservation. Because Section 106 consultation is an iterative process, Section 106 consultation were assumed to cover at least four iterations of consultation with all consulting parties (the initiation of consultation with tribes and other consulting parties, the determination of NRHP-eligibility for the historic district and for any archaeological resources that may be identified

during the Phase 1B archaeological investigation, the finding of effect, and the resolution of any adverse effects). It is expected that Section 106 consultation for the alternatives included in this FFS consist of the exchange of documentation through correspondence and would not require meetings.

3.1 Alternative 1: No Action

Under this alternative, no action would be taken to remove, clean, encapsulate, or contain contaminated building materials observed at the site. Because contaminated media would remain in place, the potential for continued migration of contaminants would not be mitigated. Additionally, no institutional controls would be implemented to prevent intrusive activities into the waste materials. The no-action alternative has been included as a requirement of the NCP and to provide a basis for the comparison of the remaining alternatives.

This alternative does not provide minimal protection to human or environmental exposure, nor is it considered a permanent remedy because it does not reduce the toxicity, volume, or mobility of the hazardous waste on the site. The resultant risks associated with the no-action alternative would be similar to those that existed at the time of the RI field investigation.

3.2 Alternative 2: Building Decontamination and Encapsulation

Description of Remedial Alternative

Alternative 2 involves the removal of debris within the structures as necessary to gain access for work; chemical cleaning and encapsulation of contaminated concrete and cinderblock at structures where the RDCSRS and Non-RDCSRS were exceeded for PCBs; removal and disposal of caulk and sealant with PCB concentrations observed over 50 ppm as required by 40 CFR Sections 761.61 and 761.62; encapsulation of caulk and sealant with PCB concentrations below 50 ppm as required by 40 CFR Sections 761.61 and 761.62; containerization and off-site disposal of sludge, sediment, and surface water; and ACM and LBP abatement at structures where remedial actions will occur and a potential future use exists. This alternative also looks at the use of institutional controls to limit exposure. Institutional controls related to PCB contamination are deemed acceptable for use in low-occupancy use areas if PCB concentrations are less than 50 ppm and the site is fully fenced with posted warning signs.

Chemical Cleaning and Encapsulation

The analytical results from previous investigations indicate that there are nine structures at the RTI OU3 area with detected concentrations of PCBs in concrete slabs, cinderblock walls, and/or caulking around window and door frame joints that exceeded the RDCSRS and Non-RDCSRS clean up criteria. In order to meet the action and chemical specific ARARs, contaminated concrete, cinderblock, and caulk with PCB concentrations greater than 0.2 ppm will be cleaned with a

commercial solvent designed for PCB extraction or degradation to less than 50 ppm for high-occupancy buildings or to less than 100 ppm for low-occupancy buildings prior to application of an encapsulant as allowed under 40 CFR Sections 761.61 and 761.62 and summarized in Table 2-2. Table 3-1 notes the assumed occupancy of the structures, and lists buildings that are deemed unfit for reuse and those that have the potential for reuse based on their structural integrity and layout. An encapsulant will be used to limit contact with PCBs identified in the floor slabs and cinderblock walls, and will also impede volatilization of PCBs (Guo 2012). Encapsulant applied to the floors, walls, and joints (in direct contact with caulk) will include two coatings of contrasting color to indicate when resurfacing is required due to wear. Several encapsulants that are effective for reducing the potential for PCB migration and minimizing potential for dermal contact include two-stage epoxy coatings, acrylic and latex paints, and silicone sealants. Previous pilot testing and studies (Gou 2012) have shown that an epoxy coating on caulk and an acrylic coating on adjacent concrete are the most effective combination of encapsulation substances. Long-term monitoring plans will be required at each of these structures to monitor the integrity of the seal or coating and to determine whether the coating needs to be reapplied.

Concrete or cinderblock in direct contact with source material PCB-contaminated caulk (caulk with PCB concentrations greater than 50 ppm) will also be cleaned and encapsulated. Structures with PCB concentrations within the RDCSRS or Non-RDCSRS criteria were not considered under this alternative. Chemical cleaning and encapsulation of PCB-contaminated materials are evaluated in detail at each of these structures in Section 4.1.2.

It was determined, based upon review of structures with PCB-contaminated concrete and/or cinderblock, that structures considered unfit for future use would be subject to institutional controls and those considered fit for future reuse would undergo the process of decontamination and encapsulation, as shown in Table 2-1. Structures affected under this alternative are shown in Figures 3-1 through 3-3.

Removal and Disposal of Caulk and Sealant

Prior to cleaning or encapsulation, caulk or sealant material having PCB concentrations above 50 ppm will be considered source material and will be removed using manual (utility knife, scraper, ripping, hammer and chisel, or other) and/or mechanical techniques (sandblasting, hydroblasting, grinding, or other). Upon removal, contaminated material will be properly disposed of in accordance with state and federal regulations.

ACM and LBP Abatement

ACM and LBP abatement will occur prior to chemical cleaning or encapsulation to prevent disturbance of the ACM or LBP. LBP abatement will be performed for any building components remaining on site that have potential future use value. Non-friable, non-regulated ACM material (ACM with less than 1% asbestos

material) can remain on site if undisturbed. If the ACM being removed contains 1% or more of asbestos, is from a commercial facility, and is considered nonfriable asbestos material, then this waste may be managed and disposed of as either ID 13C, Construction and Demolition Debris, or ID 27A, Solid Waste in New Jersey. According to the EPA, these disposal options are based on Category I nonfriable asbestos materials, which are asbestos-containing resilient floor covering, asphalt roofing products, packing, and gaskets, which rarely become friable if handled responsibly. Generally these materials do not release significant amounts of asbestos fibers, even when damaged (NJDEP 2013b).

If the material contains more than 1% asbestos material and cannot retain the classification as nonfriable ACM, remediation must comply with the disposal requirements of ACM in accordance with NJAC 7:26-2.12, including management and disposal at a permitted solid waste facility as ID 27A, Solid Waste in New Jersey. Removal requirements defined in 40 CFR 61.145(c) will be adhered to during demolition and removal from the site to control asbestos emissions. These procedures include adequately wetting all ACM exposed during removal, ensuring that it remains wet until collected, is sealed in leak-tight containers or leak-tight wrapping, and is labeled in preparation for disposal as specified by OSHA in accordance with 40 CFR 61.150 (NJDEP 2013b).

Removal of Surface Water, Oil, Sludge, and Sediment
Surface water observed in the Cistern, oil found in the wall-mounted transformer in Building R-34, and sludge and sediment observed in the No. 2 Sewage Treatment Plant will be removed and containerized for off-site disposal. The Cistern and No. 2 Sewage Treatment Plant will be inspected following the removal of their contents, and, if necessary, disconnected from service to prevent future impacts. The transformer within Building R-34 will be disposed of off site.

Cost
The cost to conduct Alternative 2 is estimated to be $1,545,000, and yearly operations and maintenance (O&M) to monitor the integrity of the coatings will cost approximately $23,000. Assuming 30 years of O&M will be required and an inflation rate of 7%, the net present worth of this alternative is estimated to be $2,570,000. Table 3-2 summarizes the cost estimates under Alternative 2 for individual buildings. Detailed cost estimate tables are included in Appendix A.

3.3 Alternative 3: Structure Demolition/Selective Removal

Description of Remedial Alternative
Alternative 3 involves the removal of debris within the structures as necessary to gain access for work; demolition, removal, and off-site disposal of contaminated concrete and cinderblock structures where the RDCSRS and Non-RDCSRS were exceeded for PCBs; removal and disposal of caulk and sealant with PCB contamination; containerization and off-site disposal of sludge, sediment, and surface

water; and ACM and LBP abatement at structures where remedial actions will occur and a potential future use exists.

Demolition, Removal and Off-Site Disposal

Structures containing contaminated concrete, cinderblock, and caulk with PCB concentrations greater than 0.2 ppm may be demolished, removed, and disposed of off site as required under the action and chemical specific ARAR 40 CFR 761 which is summarized in Table 2-2. Concrete and cinderblock will be extracted either in bulk or through surface scarification depending on whether the building is deemed fit for reuse. Table 3-1 lists buildings that are deemed unfit for reuse and those that have the potential for reuse based on their structural integrity and layout. For those buildings that are identified for potential reuse, the contaminated areas will be scarified and restored. Contaminated buildings that are not designated for future use (e.g., Test Stand 12) and meet the disposal threshold, as identified in Table 2-2, will be removed in their entirety. This FFS does not account for potential historic district designations. Building materials that have been removed may be disposed of in accordance with state and federal regulations (i.e., waste regulatory requirements at NJAC 7:26 and 40 CFR 761).

The analytical results from previous investigations indicate that there are nine structures at the RTI OU3 area that require remediation of the concrete slabs, cinderblock walls, and/or caulking around window and door frame joints due to PCB contamination. Concrete or cinderblock in direct contact with PCB-contaminated caulk will also be cleaned and encapsulated. Structures that did not have PCB concentrations that exceeded the RDCSRS or Non-RDCSRS criteria were not considered under this alternative. Demolition, removal, and disposal of PCB-contaminated materials are evaluated at each of these structures as detailed in Section 4.1.3.

Concrete materials containing concentrations of contamination entirely below the NJDEP RDCSRS criteria, including PCBs, metals, SVOCs, and pesticides, are considered eligible for recycling or beneficial reuse under the requirements listed in NJAC 7:26A-1.4(a)2, 7, or 20.

Structures affected under this alternative are shown in Figures 3-4 through 3-6.

Removal and Disposal of Caulk and Sealant

Caulk or sealant material that has concentration of PCBs will be removed using manual (e.g., utility knife, scraper, ripping, or hammer and chisel) and/or mechanical techniques (e.g., sandblasting, hydroblasting, or grinding). Once removed, the contaminated material will be properly disposed of according to state and federal regulations.

ACM and LBP Abatement

ACM and LBP abatement are common activities to both alternatives. ACM abatement will occur as described for Alternative 2. LBP abatement will be

performed for any building components remaining on site that have potential future use value; however, abatement of LBP will not be required on any material identified for disposal or recycling.

Removal of Surface Water, Oil, Sludge, and Sediment

Surface water observed in the Cistern, oil found in the wall-mounted transformer in Building R-34, and sludge and sediment observed at the No. 2 Sewage Treatment Plant will be removed and containerized for off-site disposal. The Cistern and No. 2 Sewage Treatment Plant will be inspected following the removal of their contents, and, if necessary, disconnected from service to prevent future impacts. The transformer within Building R-34 will be disposed of off site.

Cost

The cost to conduct Alternative 3 for all of the buildings is estimated to be $1,999,000, with no yearly O&M cost. The net present worth of this alternative is estimated to be $2,010,000. Table 3-3 summarizes the cost estimates for Alternative 3 for individual buildings. Detailed cost estimate tables are included in Appendix A.

Table 3-1 Alternatives Summary for Buildings/Structures at OU3 Radiation Technology Superfund Site Rockaway Township, New Jersey

Buildings/ Structures	Future Use	Observed Contamination	Alternative 2 (Chemical Cleaning and Encapsulation): Proposed Actions	Alternative 3 (Demolition and Off-Site Disposal): Proposed Actions
P2 Area				
R-47	Potential Future Use as a high-occupancy building	Concrete: Total PCBs and Pesticides Cinderblock: Total PCBs and TAL metals Sub-slab Soil: TAL Metals and SVOCs ACM LBP	• Remove debris • ACM Abatement • LBP Abatement • Decontaminate and Encapsulate concrete slab • Encapsulate Cinderblock Walls	• Remove debris • ACM Abatement • LBP Abatement • Scarify Concrete Slab and dispose of demolition waste from slab in TSCA-certified landfill. • Demolish Cinderblock walls and dispose of as solid waste.
Paint Locker	Potential Future Use as a low-occupancy building	Cinderblock: PAHs Caulk: Total PCBs LBP	• Remove debris • LBP Abatement • Encapsulate cinderblock walls	• Remove debris • LBP Abatement • Demolish cinderblock walls and dispose of as solid waste
Fuel Storage Area	No Future Use due to type of structure	None	None	None
Igniter Storage	Potential Future Use as a low-occupancy building	ACM LBP	• Remove debris • ACM Abatement • LBP Abatement	• Remove debris • ACM Abatement • LBP Abatement
Acid (Oxidizer) Storage Tank	No Future Use due to type of structure	None	None	None
Pump House 2 (P-2)	No Future Use due to type of structure	ACM	None	None
R-43	No Future Use; building is collapsed	LBP	None	None

Table 3-1 Alternatives Summary for Buildings/Structures at OU3 Radiation Technology Superfund Site Rockaway Township, New Jersey

Buildings/ Structures	Future Use	Observed Contamination	Alternative 2 (Chemical Cleaning and Encapsulation): Proposed Actions	Alternative 3 (Demolition and Off-Site Disposal): Proposed Actions
R-34	Potential Future Use as a high-occupancy building	Concrete: Total PCBs (<1 ppm) and TAL metals Cinderblock: Total PCBs (<1 ppm) Sub-slab Soils: TAL Metals and SVOCs Transformer Oil: Total PCBs ACM LBP	• Remove Debris • ACM Abatement • LBP Abatement • Remove wall-mounted transformer and oil	• Remove Debris • ACM Abatement • LBP Abatement • Remove wall-mounted transformer and oil
South Stand Area				
Test Stand 12	No Future Use due to type of structure	Concrete: Total PCBs Caulk: Total PCBs ACM	• Remove Debris • ACM Abatement • Remove and dispose of caulk • Install Institutional Controls around perimeter of test stand.	• Remove Debris • ACM Abatement • Remove and dispose of caulk • Full demolition of Test Stand and dispose of as solid waste
S-46	Potential Future Use as a high-occupancy building	Concrete: Total PCBs and Pesticides Cinderblock: Total PCBs (<1 ppm) Caulk: Total PCBs Sub-slab Soils: TAL Metals and SVOCs ACM LBP	• Remove debris • ACM Abatement • LBP Abatement • Encapsulate caulk • Decontaminate and Encapsulate concrete slab floor (whole building)	• Remove debris • ACM Abatement • LBP Abatement • Remove and replace caulk • Scarify concrete slab and dispose of in TSCA landfill.
Test Stand 11	No Future Use due to type of structure	ACM	• None	• None
Test Stand 37	No Future Use due to type of structure	ACM	• None	• None
Propane Storage Area	No Future Use due to type of structure (concrete pad)	None	None	None
No. 1 Sewage Treatment Plant	No Future Use due to type of structure	None	None	None

Table 3-1 Alternatives Summary for Buildings/Structures at OU3 Radiation Technology Superfund Site Rockaway Township, New Jersey

Buildings/ Structures	Future Use	Observed Contamination	Alternative 2 (Chemical Cleaning and Encapsulation): Proposed Actions	Alternative 3 (Demolition and Off-Site Disposal): Proposed Actions
South Stand Area (Cont.)				
S-48	No Future Use as structure does not currently exist	None	None (Building was removed during previous site activities)	None (Building was removed during previous site activities)
T-50	No Future Use due to type of structure	None	None	None
S-49	No Future Use due to type of structure	None	None	None
East Stand Area				
Test Stand 2 (R-2)	No Future Use due to type of structure	Concrete: Total PCBs (<1 ppm) LBP	None	None
R-33	Potential Future Use as a high-occupancy building	LBP	LBP Abatement	LBP Abatement
R-29	Potential Future Use as a high-occupancy building	ACM	Remove Debris ACM Abatement	Remove Debris ACM Abatement
R-21	Potential Future Use as a high-occupancy building	Concrete: Total PCBs, SVOCs, and Pesticides Cinderblock: Total PCBs (<1 ppm) Caulk: Total PCBs Subslab Soil: SVOCs ACM LBP	• Remove Debris • ACM Abatement • LBP Abatement • Encapsulate caulk • Decontaminate and Encapsulate concrete slab	• Remove Debris • ACM Abatement • LBP Abatement • Remove and dispose of caulk • Scarify concrete slab and dispose of as solid waste. Restore floor as necessary.
Pump House 3 (P-3)	No Future Use due to type of structure	LBP	None	None

Table 3-1 Alternatives Summary for Buildings/Structures at OU3 Radiation Technology Superfund Site Rockaway Township, New Jersey

Buildings/ Structures	Future Use	Observed Contamination	Alternative 2 (Chemical Cleaning and Encapsulation): Proposed Actions	Alternative 3 (Demolition and Off-Site Disposal): Proposed Actions
East Stand Area (Cont.)				
Test Stand 3 (R-3)	No Future Use due to type of structure	LBP	None	None
Pump House 4 (P-4)	No Future Use due to type of structure	None	None	None
R-51	Potential Future Use as a high-occupancy building	ACM LBP	• Remove Debris • ACM abatement • LBP Abatement	• Remove Debris • ACM abatement • LBP Abatement
Test Stand 4 (R-4)	Potential Future Use as a high-occupancy building	Concrete: Total PCBs and TAL metals ACM LBP	• Remove Debris • ACM abatement • LBP abatement • Decontaminate and Encapsulate concrete slab	• Remove Debris • ACM abatement • LBP abatement • Scarify concrete floor slab. Dispose of as solid waste
Water Tower	No Future Use due to type of structure	ACM LBP	• None	• None
Building Associated with the Water Tower	No Future Use due to type of structure	ACM LBP	• None	• None
Cistern/Cistern Pump	No Future Use due to type of structure	Water: Total PCBs, Pesticides, and TAL Metals	Pump Surface water from Cistern, containerize, dispose of	Pump Surface water from Cistern, containerize, dispose
No. 2 Sewage Treat-ment Plant	No Future Use due to type of structure	Water: TAL Metals Sludge: BNAs and TAL Metals	Extract water and sludge from plant, containerize, and dispose of	Extract water and sludge from plant, containerize, and dispose of
Scrubber	No Future Use due to type of structure	None	None	None
Water Cooling Tower	No Future Use due to type of structure	ACM	None	None

Table 3-1 Alternatives Summary for Buildings/Structures at OU3 Radiation Technology Superfund Site Rockaway Township, New Jersey

Buildings/ Structures	Future Use	Observed Contamination	Alternative 2 (Chemical Cleaning and Encapsulation): Proposed Actions	Alternative 3 (Demolition and Off-Site Disposal): Proposed Actions
Condenser and Hot well	No Future Use due to type of structure	Concrete: Total PCBs (<1 ppm)	None	None
Transformer Bank	No Future Use due to type of structure	None	None	None
Agitator and Effluent Treatment Basin	No Future Use due to type of structure	None	None	None

Key:
TAL = Target Analyte List.

Table 3-2 Preliminary Construction Cost Estimate, Alternative 2
Building Decontamination and Encapsulation
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Building	Capital Cost[1]	O&M Cost[1] (30 Years)	Total Alternative Cost[2]
P2 Area			
R-47	$587,000	$285,000	$870,000
Paint Locker	$59,000	$174,000	$230,000
Igniter Storage	$30,000	--	$30,000
R-34	$43,000	--	$40,000
South Stand Area			
Test Stand 12	$91,000	--	$90,000
S-46	$190,000	$199,000	$390,000
East Stand Area			
R-29	$43,000	--	$40000
R-21	$191,000	$186,000	$380,000
R-51	$37,000	--	$40,000
Test Stand 4	$186,000	$186,000	$370,000
Cistern/Cistern Pump	$42,000	--	$40,000
No. 2 Sewage Treatment Plant	$46,000	--	$50,000
GRAND TOTAL	**$1,545,000**	**$1,030,000**	**$2,570,000**

[1] Rounded to nearest $1,000.
[2] Rounded to nearest $10,000.

Table 3-3 Preliminary Construction Cost Estimate, Alternative 3
Building Decontamination and Encapsulation
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Building	Capital Cost[1]	O&M Cost[1] (30 Years)	Total Alternative Cost[2]
P2 Area			
R-47	$608,000	--	$610,000
Paint Locker	$72,000	--	$70,000
Igniter Storage	$30,000	--	$30,000
R-34	$43,000	--	$40,000
South Stand Area			
Test Stand 12	$397,000	--	$400,000
S-46	$259,000	--	$260,000
East Stand Area			
R-29	$43,000	--	$40,000
R-21	$236,000	--	$240,000
R-51	$37,000	--	$40,000
Test Stand 4	$186,000	--	$190,000
Cistern/Cistern Pump	$42,000	--	$40,000
No. 2 Sewage Treatment Plant	$46,000	--	$50,000
GRAND TOTAL	**$1,999,000**	**--**	**$2,010,000**

[1] Rounded to nearest $1,000.
[2] Rounded to nearest $10,000.

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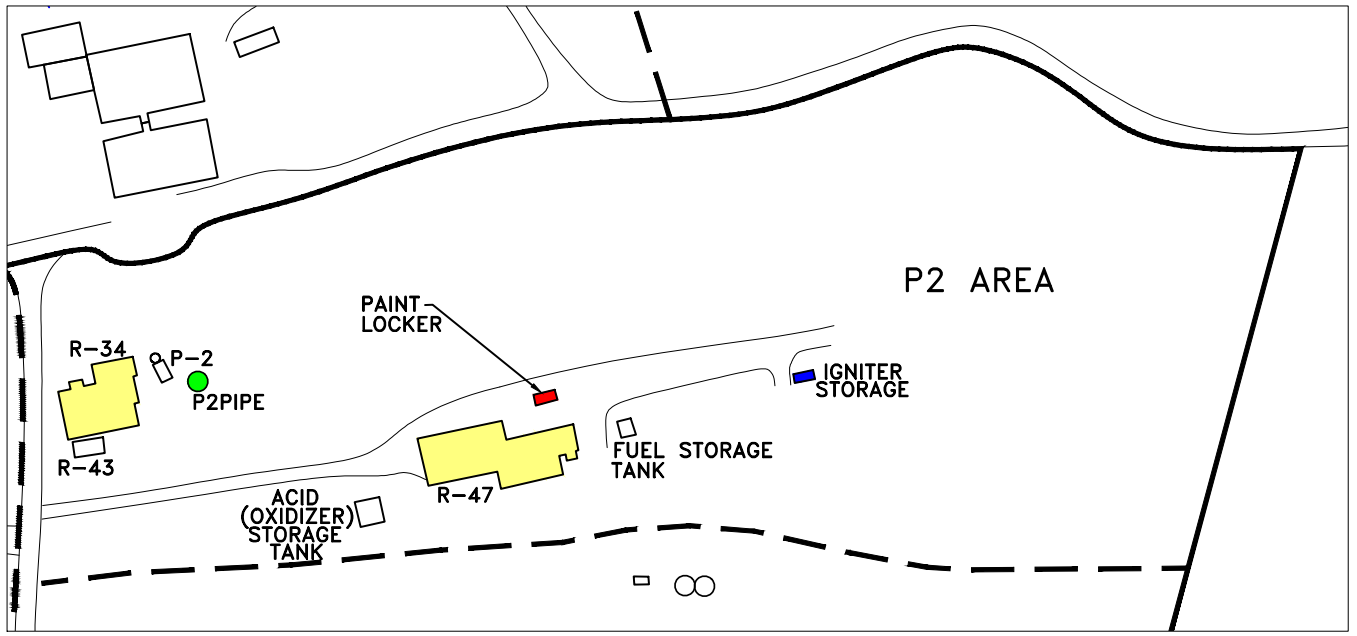

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FIGURE 3-1 ALTERNATIVE 2: P2 AREA PROPOSED BUILDING REMEDIATION ACTIVITIES
RADIATION TECHNOLOGY SUPERFUND SITE, OU3
ROCKAWAY TOWNSHIP, NEW JERSEY

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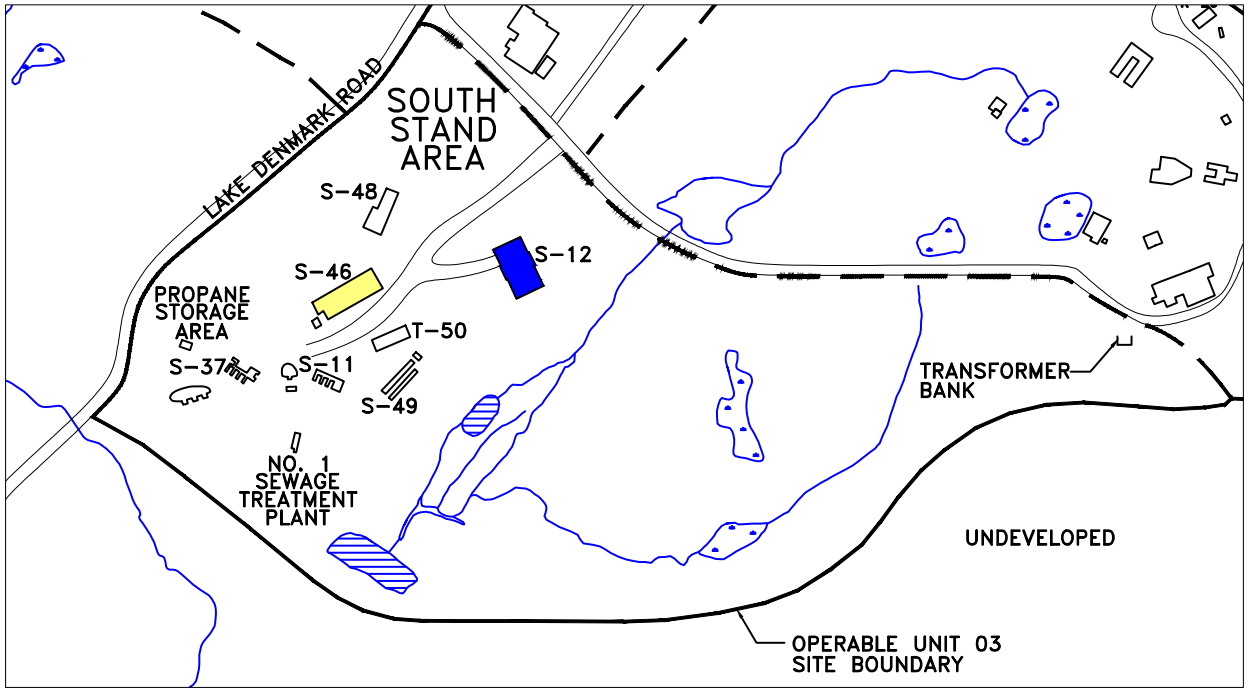

SCALE IN FEET

0 300 600 900

LEGEND

- CONCRETE SLAB ENCAPSULATION, CINDERBLOCK WALL ENCAPSULATION, AND ACM ABATEMENT SUB-SLAB SOIL CONTAMINATION OBSERVED ABOVE SCREENING CRITERIA
- ACM ABATEMENT AND CONCRETE SLAB ENCAPSULATION
- STREAM
- MARSHY AREA
- WATER BODY

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FIGURE 3-2 ALTERNATIVE 2: SOUTH STAND AREA PROPOSED BUILDING REMEDIATION ACTIVITIES
RADIATION TECHNOLOGY SUPERFUND SITE, OU3
ROCKAWAY TOWNSHIP, NEW JERSEY

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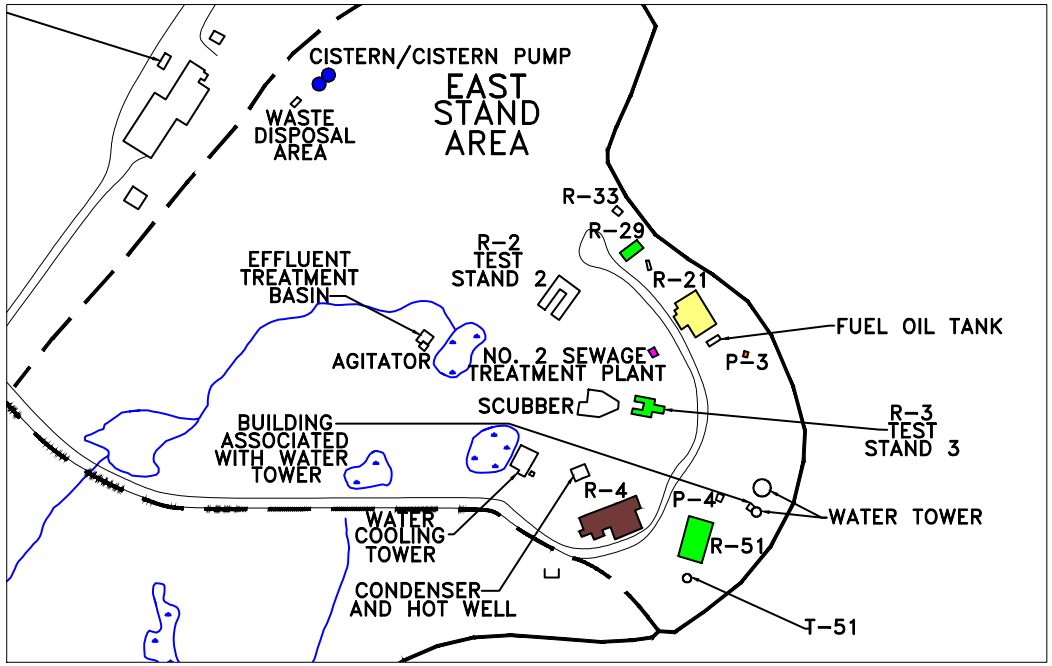

SCALE IN FEET

0 300 600 900

LEGEND

- CONCRETE SLAB ENCAPSULATION, CINDERBLOCK WALL ENCAPSULATION, AND ACM ABATEMENT SUB-SLAB CONTAMINATION OBSERVED ABOVE SCREENING CRITERIA
- ACM ABATEMENT
- COLLECTION/DISPOSAL OF SURFACE WATER
- ACM ABATEMENT AND COLLECTION/DISPOSAL OF SLUDGE
- CONCRETE SLAB ENCAPSULATION, ACM ABATEMENT, AND LBP ABATEMENT
- LBP ABATEMENT
- STREAM
- MARSHY AREA
- WATER BODY

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FIGURE 3-3 ALTERNATIVE 2: EAST STAND AREA PROPOSED BUILDING REMEDIATION ACTIVITIES
RADIATION TECHNOLOGY SUPERFUND SITE, OU3
ROCKAWAY TOWNSHIP, NEW JERSEY

R2-0005777

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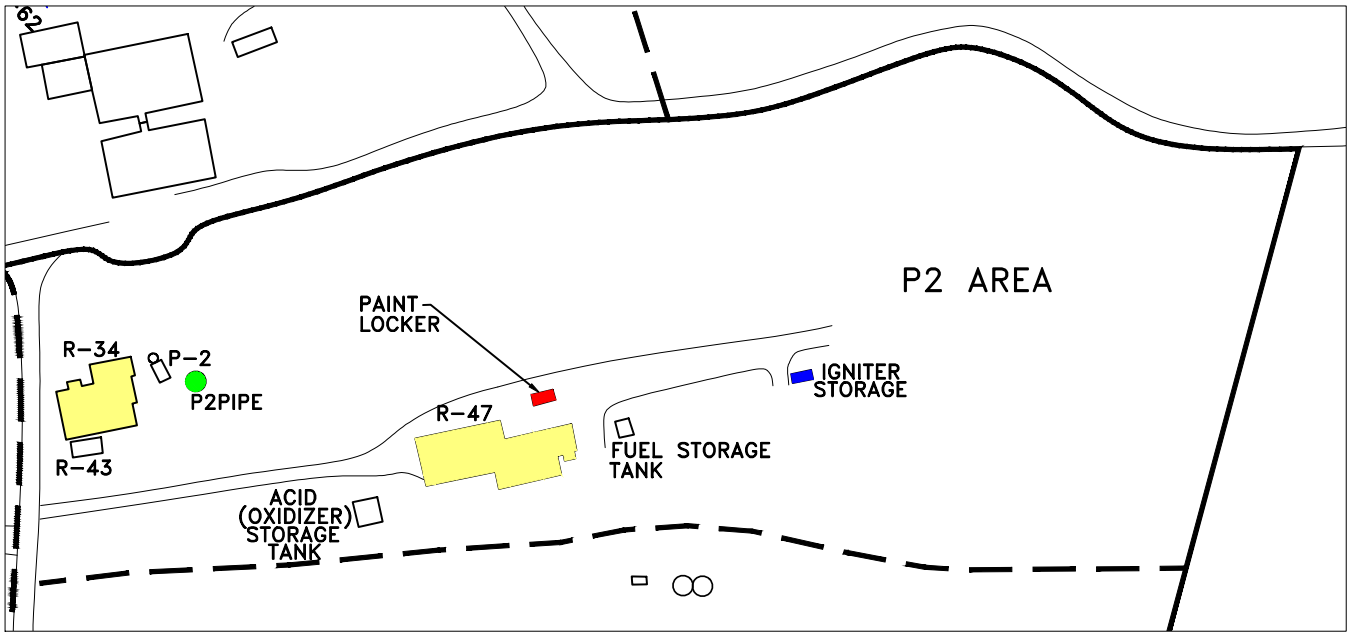

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FIGURE 3-4 ALTERNATIVE 3: P2 AREA PROPOSED BUILDING REMEDIATION ACTIVITIES
RADIATION TECHNOLOGY SUPERFUND SITE, OU3
ROCKAWAY TOWNSHIP, NEW JERSEY

R2-0005778

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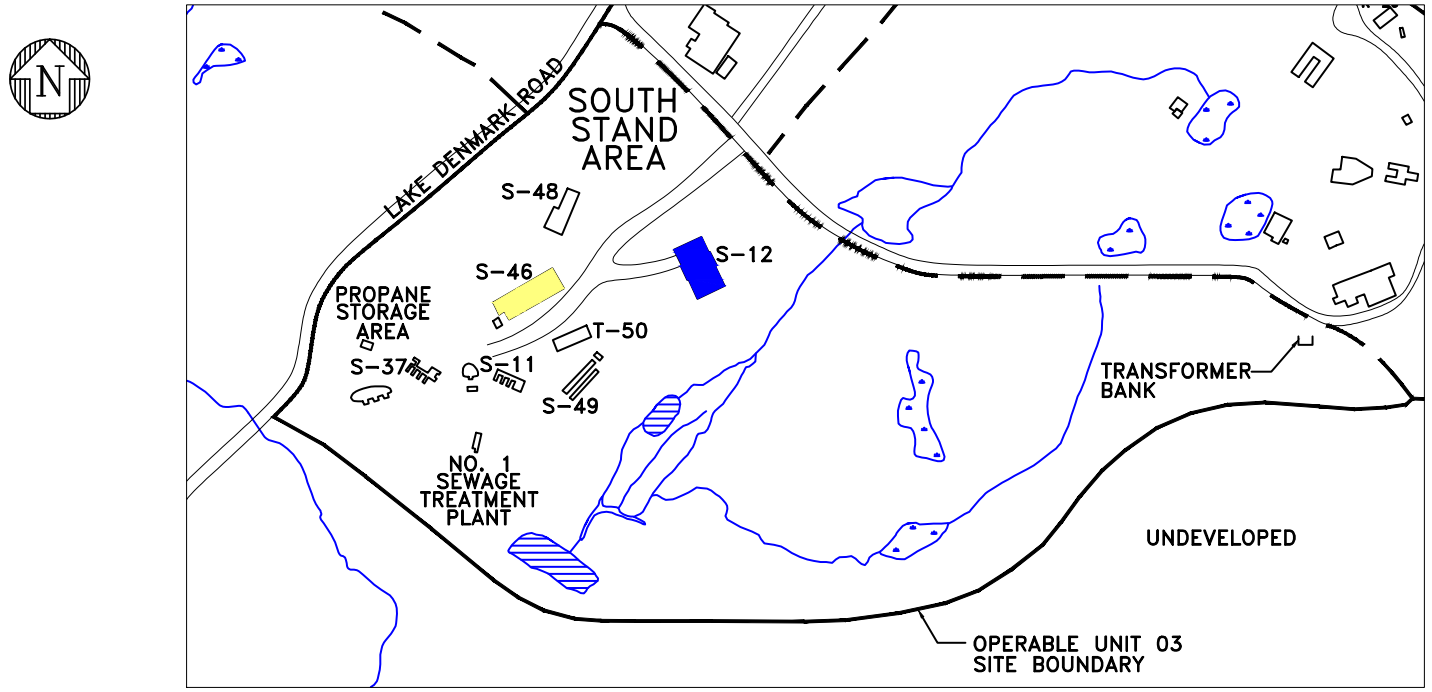

SCALE IN FEET

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LEGEND

- CONCRETE SLAB DEMOLITION, CINDERBLOCK WALL DEMOLITION, AND ACM ABATEMENT SUB-SLAB CONTAMINATION OBSERVED ABOVE SCREENING CRITERIA
- ACM ABATEMENT AND CONCRETE SLAB DEMOLITION
- STREAM
- MARSHY AREA
- WATER BODY

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FIGURE 3-5 ALTERNATIVE 3: SOUTH STAND AREA PROPOSED BUILDING REMEDIATION ACTIVITIES
RADIATION TECHNOLOGY SUPERFUND SITE, OU3
ROCKAWAY TOWNSHIP, NEW JERSEY

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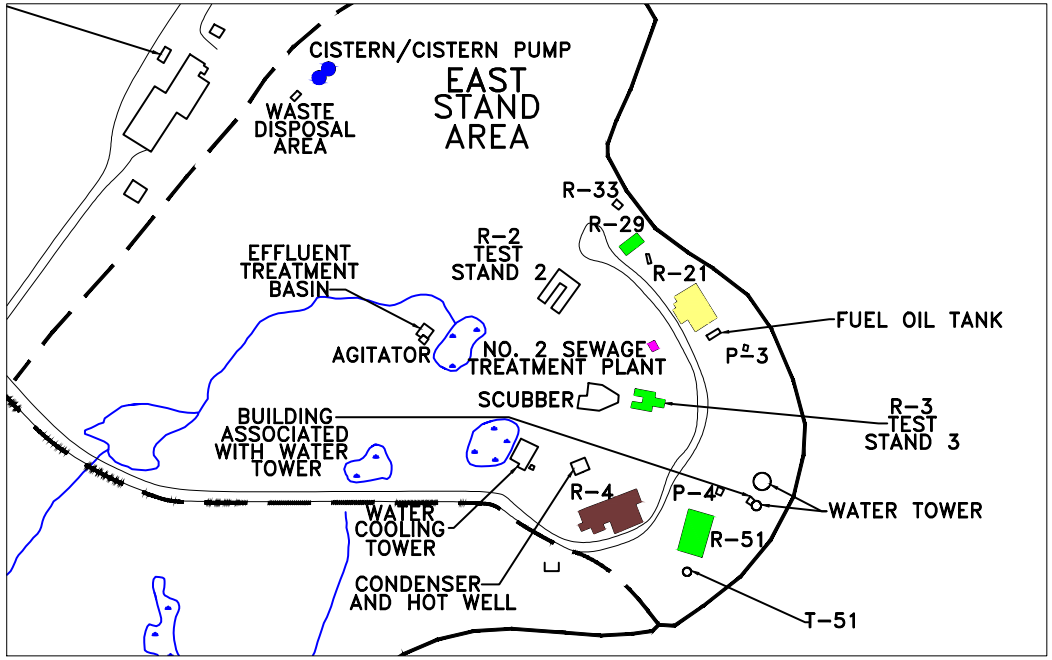

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FIGURE 3-6 ALTERNATIVE 3: EAST STAND AREA PROPOSED BUILDING REMEDIATION ACTIVITIES
RADIATION TECHNOLOGY SUPERFUND SITE, OU3
ROCKAWAY TOWNSHIP, NEW JERSEY

4 Detailed Analysis of Alternatives

The detailed analysis of alternatives is intended to provide the relevant information required to select a preferred remedy. The evaluation of alternatives was conducted using EPA's nine primary evaluation criteria, which are listed in Section 300.430 in Paragraph (e) (9) (iii) of the NCP. These criteria are:

- Overall protection of human health and the environment;
- Compliance with ARARs;
- Short-term impacts and effectiveness;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, and volume;
- Implementability;
- Cost;
- State acceptance; and
- Public acceptance.

It should be noted that the final two criteria (State and Community Acceptance) are used to modify the selection of an alternative. These criteria will be assessed after the public comment period that follows issuance of the Proposed Plan (the precursor to the ROD). Therefore, these two criteria will not be used in the evaluation presented in this FFS.

The remaining seven evaluation criteria will be used as the basis of the detailed analysis, which will provide information that can be used in selecting a preferred remedial action alternative. Descriptions of each of the evaluation criteria are provided below:

Overall Protection of Human Health and the Environment – This criterion provides a final check to assess whether each alternative provides adequate protection of human health and the environment. The assessment of overall protection draws on the evaluation of the other criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

Evaluation of the overall protectiveness of an alternative will focus on whether a specific alternative achieves adequate protection and will describe how site risks posed through each pathway being addressed by the FFS are eliminated, reduced, or controlled through treatment, engineering, or institutional controls. This

evaluation will allow for consideration of whether an alternative poses any unacceptable short-term or cross-media impacts.

Compliance with ARARs – This criterion will be used to determine whether each alternative will meet the identified ARARs. The detailed analysis will summarize which requirements are applicable, relevant, and appropriate to an alternative and describe how the alternative meets these requirements.

Long-Term Effectiveness and Permanence – This criterion evaluates results of the remedial action in terms of the risk remaining at the site after response objectives have been met. The primary focus of this evaluation will be the extent and effectiveness of the controls that may be required to manage the risk posed by treatment residuals and/or untreated wastes remaining at the site.

Reduction of Toxicity, Mobility, or Volume Through Treatment – This criterion addresses the regulatory preference for selecting removal or remedial actions that employ treatment technologies permanently and significantly reducing the toxicity, mobility, or volume of the contaminants.

Short-Term Effectiveness – This criterion will evaluate the effects that the alternative will have on human health and the environment during its construction and implementation phase.

Implementability – This criterion evaluates the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required to construct and provide O&M.

Cost – Each alternative will have a detailed cost estimate prepared. The estimate will include:

- Estimation of capital and O&M costs; and
- Present worth analysis.

Estimated costs developed as part of the FFS are expected to provide an accuracy of +50% to -30%.

In Section 4.1, the alternatives are evaluated for each building individually using the above-referenced criteria. A summary of the individual analyses is presented in Table 4-1. In Section 4.2, a comparative analysis of the alternatives (e.g., Alternative 2 versus Alternative 3) is performed to show how the alternatives rate when compared to each other and to the evaluation criteria, and a summary of the evaluation is presented in Table 4-2.

4.1 Individual Analysis of Alternatives

4.1.1 Alternative 1: No Action

Under this alternative, no remedial action would be undertaken at the RTI Superfund site for OU3. The site would remain in its current condition and all buildings and structures would remain in their existing state.

Alternative 1 provides no increased protection of human health or the environment, and ARARs would not be met. Since no construction activities would be performed, implementation of this alternative provides no adverse impacts in the short term.

With regard to long-term effectiveness and permanence, Alternative 1 provides none, in that no remedial action would be implemented. Additionally, there is no reduction of toxicity, mobility, or volume.

The no-action alternative is readily implementable in that nothing is required to be constructed, maintained, or monitored. There are no costs associated with this alternative.

Since no action is taken in this alternative, an analysis compared to the evaluation criteria for each structure is not presented.

4.1.2 Alternative 2: Building Material Decontamination and Encapsulation

Under this alternative, selective building rehabilitation would be undertaken. This includes the cleaning and encapsulation of contaminated concrete and cinderblock; removal of source caulk and sealant material (PCB concentrations greater than 50 ppm); encapsulation of caulk with PCB concentrations less than 50 ppm; collection and disposal of contaminated surface water, oils, sludge, and sediment; and abatement of ACM and LBP within structures where potential future use exists. This alternative assumes that non-hazardous debris that is scattered around many of the structures will only be removed if it is necessary for remedy implementation.

It is assumed that all structures will be remediated to meet industrial risk screening levels or NJDEP non-RDCSRS criteria for the occupancy rating that was presented in Table 3-1. The following is an analysis of the alternative when compared to the evaluation criteria for each structure.

The abatement of ACM and LBP is common among many of the structures that contain these materials. The preferred remedial alternative for ACM and LBP, when abatement is required, is removal. The evaluation of ACM and LBP against the EPA evaluation criteria of overall protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, short-term effectiveness, and implementability will be the same for each structure where they are

encountered and removal occurs. The evaluations of these materials are as follows:

For ACM removal, Alternative 2 provides good overall protection of human health and the environment. The abatement of ACM would reduce the risk associated with direct human exposure. This alternative would meet the chemical-specific ARARs for asbestos (40 CFR 61.141); additionally, it would meet the action-specific ARARs for ACM abatement and transportation. It is assumed that all location-specific ARARs (location near endangered species, wetlands, and secondary contact and indigenous aquatic life waters) would be met as work will be performed inside and directly adjacent to the buildings to avoid environmentally sensitive areas identified on site. Since no demolition of site structures is involved, ARARs for historic preservation would also be met.

For ACM removal, this alternative also provides long-term effectiveness and permanence in that human exposure would be reduced through the removal and off-site disposal of ACM. Under this alternative, there would be no reduction of toxicity or volume of ACM since toxicity and volume are merely transferred to the disposal facility, but the mobility of ACM will be reduced significantly. The short-term effectiveness of this alternative as it relates to ACM removal is good since it can be quickly removed by professionals who will be trained in preventing further exposure risk to human health and the environment during its construction and implementation phase. This is accomplished by controlling fugitive dust and debris during ACM abatement.

For ACM removal, implementability is good since this alternative employs common remedial techniques with ample local contractors available to perform the work.

For LBP removal, Alternative 2 provides good overall protection of human health and the environment. The abatement of LBP would reduce the risk associated with direct human exposure. This alternative would meet the chemical-specific, action-specific, and location-specific ARARs for LBP and the site. Since no demolition of site structures is involved, ARARs for historic preservation would also be met.

For LBP removal, this alternative also provides long-term effectiveness and permanence in that human exposure would be reduced through the removal and off-site disposal of LBP. Under this alternative, there would be no reduction of toxicity or volume of LBP since toxicity and volume are merely transferred to the disposal facility, but the mobility of LBP will be reduced significantly. The short-term effectiveness of this alternative as it relates to LBP removal is good since it can be quickly removed by professionals who will be trained in preventing further exposure risk to human health and the environment during its construction and implementation phase. This is accomplished by controlling fugitive dust and debris during LBP abatement.

For LBP removal, implementability is good since this alternative employs common remedial techniques with ample local contractors available to perform the work.

4.1.2.1 P2 Area Evaluation

R-47

Building R-47 concrete and/or cinderblock contains PCBs above industrial screening levels and PCBs and Dieldrin that exceed removal management screening levels. Since the pesticide detection is co-located with the PCB detections, it is assumed that remediation targeting PCBs will also address this pesticide contaminant. Building R-47 contains both ACM and LBP. Under Alternative 2, ACM and LBP will be removed, and concrete and cinderblock will be decontaminated and sealed.

For PCB-contaminated structures, Alternative 2 provides good protection of human health and the environment as long as the integrity of the coating or seal used in encapsulation remains intact. This alternative would reduce the risk associated with direct human exposure to the contaminated concrete slab and cinderblock walls identified in building R-47. However, if the coating or sealant used in encapsulation should wear or is disturbed during future building use, exposure to residual contamination is possible. Therefore, operations and maintenance activities are required; this includes periodic inspection of the seal.

For PCB-contaminated structures, chemical-specific and action-specific ARARs would be met. Under 40 CFR§761, appropriate off-site disposal is required for building waste material having contaminant concentrations that exceed the non-RDCSRS criteria. Based on the analytical results from the previous site investigations, the contaminant concentrations detected in the floor slab and cinderblock walls at building R-47 exceed this threshold. Therefore, if decontamination cannot achieve levels below non-RDCSRS criteria, then disposal will be the only option available. It is assumed that all location-specific ARARs (location near endangered species, wetlands, and secondary contact and indigenous aquatic life waters) would be met as work will be performed to avoid identified on-site environmentally sensitive areas. Since no demolition of site structures is involved, ARARs for historic preservation would also be met.

For PCB-contaminated structures, this alternative will not achieve long-term effectiveness and permanence in that human exposure to the contaminated structure would only be reduced through the decontamination and encapsulation of the contaminated concrete and cinderblock. However, the level of decontamination may vary based on different material porosities, or leaching of PCBs back to the surface of the materials may result in the risk of exposure if the coating or encapsulating seal is compromised.

Under this alternative, there would be no reduction of toxicity and volume through treatment of PCB-contaminated structures; however, mobility would be restricted through the use of the encapsulant. Short-term effectiveness is good under Alternative 2 since effects on human health and the environment during the implementation phase can be controlled by professionals trained in the remedial technique.

For PCB-contaminated structures, implementability is good since this alternative employs common construction techniques with ample local contractors available to perform the work. Local contractors would be available for repair of any conditions that may affect the encapsulation effectiveness.

For ACM and LBP removal, refer to the evaluation criteria discussions in Section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for the work.

Paint Locker

Paint Locker contains arsenic in the concrete, benzo(a)pyrene in the cinderblock, and PCBs in caulk above NJDEP non-RDCSRS criteria. Arsenic is assumed to be bound in the concrete so no remedial measures related to it are proposed. The cinderblock and caulk will be encapsulated but no decontamination will occur prior to sealing, since it is benzo(a)pyrene and not PCB contamination within the cinderblock. The cinderblock adjacent to the PCB-containing caulk does not need to be decontaminated or sealed since any leaching to the cinderblock that may have occurred is from a PCB-containing product with a concentration less than 50 ppm, as opposed to a spill or release which has different requirements (see Table 2-2). The Paint Locker also contains LBP, which will be removed. The Paint Locker is a small storage shed where no long-term contact will occur, and has been designated within this FFS for low-occupancy use.

For PCB- and SVOC-contaminated structures, Alternative 2 provides good protection of human health and the environment as long as the integrity of the coating or seal used in encapsulation remains intact. This alternative would reduce the risk associated with direct human exposure to the contaminated caulk and cinderblock walls. However, if the coating or sealant used in encapsulation should wear or is disturbed during future building use, exposure to residual contamination is possible. Therefore, operations and maintenance activities are required, which would include periodic inspection of the seal.

For PCB- and SVOC-contaminated structures, chemical-specific and action-specific ARARs would be met. This alternative would meet the chemical-specific ARARs for the PCB-containing caulk as the concentration of PCBs in the caulk material is less than 50 ppm, and it is not considered source material. It is assumed that all location-specific ARARs (location near endangered species, wetlands, and secondary contact and indigenous aquatic life waters) would be met as work will be performed to avoid environmentally sensitive areas identified on

site. Since no demolition of site structures is involved, ARARs for historic preservation would also be met.

For PCB- and SVOC-contaminated structures, this alternative will not achieve long-term effectiveness and permanence in that human exposure to the contaminated structure would only be reduced through the encapsulation of the contaminated concrete and cinderblock. The risk of exposure remains if the coating or encapsulating seal is compromised.

Under this alternative, there would be no reduction of toxicity, volume, or mobility through treatment of PCB- or SVOC-contaminated structures. Short-term effectiveness is good under Alternative 2 since effects on human health and the environment during the implementation phase can be controlled by professionals trained in the remedial technique.

For PCB-contaminated structures, implementability is good since this alternative employs common construction techniques with ample local contractors available to perform the work. Local contractors would be available for repair of any conditions that may affect the effectiveness of the encapsulation.

For LBP removal, refer to the evaluation criteria discussions in Section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for the work.

Fuel Storage Area

The fuel storage area is currently a concrete foundation. Contamination has not been identified in the concrete slab; therefore, the Fuel Storage Area has not been evaluated further. Under Alternative 2 the Fuel Storage Area, which is protective of human health and the environment, will remain in its existing condition.

Igniter Storage

Contamination observed in the Igniter Storage bunker consisted of metals exceeding residential screening levels; no industrial screening levels were exceeded. The Igniter Storage bunker also included the presence of ACM and LBP. Since ACM and LBP are not addressed under CERCLA, and disturbance of the material is not required to perform work, abatement is not required. However, since the building was identified by E & E as having potential reuse value, for the purposes of this document, it is assumed that removal of ACM and LBP will be performed.

For ACM and LBP removal, refer to the evaluation criteria discussions in Section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for the work.

Acid (Oxidizer) Storage Tank

The Acid (Oxidizer) Storage Tank area is currently a concrete containment area filled with debris. Contamination has not been identified in the concrete slab;

therefore, the Acid (Oxidizer) Storage Tank area has not been evaluated further. Under Alternative 2, the Acid (Oxidizer) Storage Tank area will remain in its existing condition and is protective of human health and the environment.

Pump House 2 (P-2)

The only contamination observed in Pump House 2 (P-2) during site investigations was ACM. Since ACM is not addressed under CERCLA and disturbance of the material is not required to perform the work, abatement is not required.

R-43

The only contamination observed in Building R-43 during the site investigations was the presence of LBP. Since this structure has been identified by E & E as a building that is not fit for reuse, no abatement of the LBP would be performed. Restricting entry to the building would ensure adequate protection of human health and the environment.

R-34

Industrial screening levels were exceeded for the metals antimony, arsenic, and iron in concrete samples. The metals are all assumed to be bound within the matrix of the concrete so no remedial measures are proposed to address the concrete. PCBs were identified in concrete and cinderblock at or above NJDEP RDCSRS criteria, but below NJDEP non-RDCSRS criteria and the high-occupancy threshold of 1 ppm; therefore, no decontamination or encapsulation is necessary. ACM and LBP are present within Building R-34. Since ACM and LBP are not addressed under CERCLA and disturbance of the material is not required to perform work, abatement is not required. However, since the building was identified by E & E as having potential reuse value, for the purposes of this document it is assumed that removal of ACM and LBP will be performed. The oil and wall-mounted transformer located inside building R-34 will have the PCB-oil removed and containerized, followed by disposal of the oil and transformer off site.

For the PCB transformer and oil, Alternative 2 provides good protection of human health and the environment by removing the material from site. This alternative would reduce the risk associated with direct human exposure to the open, un-sealed transformer.

For the PCB transformer and oil, chemical-specific and action-specific ARARs would be met. It is assumed that all location-specific ARARs would be met as work will be performed to avoid identified on-site environmentally sensitive areas. Since removal of the transformer requires no demolition of site structures, ARARs for historic preservation would also be met.

For the PCB transformer and oil, this alternative will achieve long-term effectiveness and permanence because the possibility of future human exposure would be eliminated at the site.

Under this alternative, there would not be a reduction of toxicity, volume, or mobility through treatment of the PCB-oil since it could be shipped to a TSCA landfill. Incineration is only required for PCB concentrations greater than 500 ppm. Short-term effectiveness is good under Alternative 2 since effects on human health and the environment during implementation can be controlled by professionals trained in proper removal. Implementability would be achieved since it employs common removal techniques with local contractors available to perform the work.

For ACM and LBP removal, refer to the evaluation criteria discussions in Section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work.

4.1.2.2 South Stand Area Evaluation

Test Stand 12

Removal management and NJDEP non-RDCSRS criteria for PCBs were exceeded in a concrete and caulk sample at Test Stand 12. Caulk will be removed since it is close to the concentration considered source material; however, since there is no future reuse for the test stand, institutional controls rather than sealing will be implemented to address the PCBs in concrete. Institutional controls are acceptable if the PCB levels are less than 50 ppm and the site is fully fenced with posted warning signs. The alternative for Test Stand 12 assumes a new fence surrounding the structure and not relying on the fence around the site for sole protection. Test Stand 12 has ACM present, which would be removed.

For PCB-contaminated concrete and caulk, Alternative 2 provides fair protection of human health and the environment as long as the fence remains intact. Operations and maintenance activities are required to maintain the fence; this includes periodic inspections.

For PCB-contaminated structures, chemical-specific and action-specific ARARs would be met. It is assumed that all location-specific ARARs (location near endangered species, wetlands, and secondary contact and indigenous aquatic life waters) would be met as work will be performed to avoid identified on-site environmentally sensitive areas. Since no demolition of site structures is involved, ARARs for historic preservation would also be met.

For PCB-contaminated structures, this alternative will not achieve long-term effectiveness and permanence because human exposure to the contaminated concrete would only be reduced through institutional controls. Caulking that is removed would achieve long-term effectiveness and permanence. Under this alternative, there would be no reduction of toxicity, volume, and mobility through treatment of PCB-contaminated concrete or caulk. Short-term effectiveness is good under Alternative 2 since effects on human health and the environment

during fence construction will occur well outside the area of detected contamination, and removal of caulk involves little risk of exposure.

For PCB-contaminated concrete and caulk, implementability is good since this alternative employs common construction techniques with ample local contractors available to perform the initial work and potential repairs that may be required on the fence.

For ACM removal, refer to the evaluation criteria discussions in Section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work.

S-46

Building S-46 concrete slab samples had NJDEP non-RDCSRS criteria exceedances in concrete for PCBs, Dieldrin, and arsenic and in cinderblock for arsenic and mercury. PCBs in caulk were below residential screening levels (NJDEP RDCSRS criteria). ACM and LBP were also present in Building S-46. The concrete slab will be decontaminated followed by encapsulation, caulk will be encapsulated, and LBP and ACM removal will occur. Since the pesticide detection is co-located with the PCB detections, it is assumed that remediation targeting PCBs will also address this contaminant. Cinderblock walls have PCB levels below the high-occupancy threshold of 1 ppm and the metals are assumed to be bound in the concrete so no remedial measures related to them are proposed. Mercury contamination is below RDCSRS criteria and has not been identified as elemental in nature; therefore, no remediation related to this contaminant is proposed.

For PCB-contaminated structures, Alternative 2 provides good protection of human health and the environment as long as the integrity of the coating or seal used to encapsulate the concrete and caulk remains intact. This alternative would reduce the risk associated with direct human exposure to the contaminated concrete slab. However, if the coating or sealant used in encapsulation should wear or is disturbed during future building use, exposure to residual contamination is possible. Therefore, operations and maintenance activities are required; this includes periodic inspection of the seal.

For PCB-contaminated structures, chemical-specific and action-specific ARARs would be met. Under 40 CFR§761, appropriate off-site disposal is required for building waste material having contaminant concentrations that exceed the non-RDCSRS criteria (10 ppm for high-occupancy use). Based on the analytical results from the previous site investigations, the contaminant concentrations detected in the floor slab exceed this threshold. Therefore, if decontamination cannot achieve levels below non-RDCSRS criteria, then disposal will be the only option available. It is assumed that all location-specific ARARs (location near endangered species, wetlands, and secondary contact and indigenous aquatic life waters) would be met as work will be performed to avoid identified on-site

environmentally sensitive areas. Since no demolition of site structures is involved, ARARs for historic preservation would also be met.

For PCB-contaminated structures, this alternative will not achieve long-term effectiveness and permanence because human exposure to the contaminated structure would only be reduced through the decontamination and encapsulation of the contaminated concrete. However, the level of decontamination may vary based on different material porosities, or leaching of PCBs back to the surface of the materials may result in the risk of exposure if the coating or encapsulating seal is compromised.

Under this alternative, there would be no reduction of toxicity or volume through treatment of PCB-contaminated structures; however, mobility of contaminants will be reduced through the use of the encapsulant. Short-term effectiveness is considered good under Alternative 2 since effects on human health and the environment during its construction and implementation phase can be controlled by professionals trained in the remedial technique.

For PCB-contaminated structures, implementability is considered good since this alternative employs common construction techniques with ample local contractors available to perform the work. Local contractors would be available for repair of conditions that may affect the encapsulation effectiveness.

For LBP and ACM removal refer to the evaluation criteria discussions in Section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work.

Test Stand 11 (S-11)

No contamination was observed at Test Stand 11 during site investigations but the presence of ACM was verified. Since ACM is not addressed under CERCLA and disturbance of the material is not required to perform work, abatement is not required.

Test Stand 37 (S-37)

Industrial screening levels for arsenic were detected in concrete and cinderblock samples. Arsenic is assumed to be bound in the concrete so no remedial measures are proposed. The presence of ACM was also verified at Test Stand 37; however ACM is not addressed under CERCLA and disturbance of the material is not required to perform, abatement is not required.

Propane Storage Area

No investigations have been performed at the propane storage area. No work is proposed at this site under OU3 and therefore evaluation of Alternative 2 against the criteria has not been performed for this area.

No. 1 Sewage Treatment Plant

No contamination has been observed in the concrete or building materials investigated at this site; therefore, the No. 1 Sewage Treatment Plant has not been evaluated further. Under Alternative 2, the No. 1 Sewage Treatment Plant will remain in its existing condition and is considered protective of human health and the environment.

S-48

Contamination observed at Building S-48 during previous site investigations included the presence of ACM and LBP. However, the building has been completely removed during previous activities at the RTI Superfund site, and these sources of contamination are no longer of concern. During the RI, metals in the concrete were found to exceed residential screening levels only; therefore, no additional work is proposed at this site under OU3. Under Alternative 2, Building S-48 will remain in its existing condition and it is considered protective of human health and the environment.

T-50

No contamination has been observed in the concrete pad. Therefore, the area has not been evaluated further and no work is proposed at this site under OU3. Under Alternative 2, Building T-50 will remain in its existing condition, which is considered protective of human health and the environment.

S-49

No contamination has been observed in the concrete pad. Therefore, the area has not been evaluated further and no work is proposed at this site under OU3. Under Alternative 2, Building S-49 will remain in its existing condition, which is considered protective of human health and the environment.

4.1.2.3 East Stand Area Evaluation

Test Stand 2 (R-2)

No contamination above industrial screening levels was observed at Test Stand 2 during site investigations but the presence of LBP was verified. The PCB concentration was below the state Non-Residential SRS threshold of 1 ppm, and since EPA TSCA regulations do not define PCB criteria below 1 ppm, no encapsulation or institutional controls are considered necessary. LBP was also observed at Test Stand 2; however, this structure has been identified by E & E as a building that is not fit for reuse. No abatement of the LBP would be performed.

R-33

Cobalt was detected but did not exceed NJDEP non-RDCSRS criteria, and no further contamination was detected in Building R-33. A small quantity of LBP was also observed in the building. Under Alternative 2, Building R-33 will require LBP abatement as it has been identified by E & E as having potential

future reuse value; refer to the evaluation criteria discussions presented in Section 4.1.2.

R-29

Mercury contamination below NJDEP RDCSRS criteria was observed in the concrete slab at Building R-29 and the presence of ACM was verified. PCB-oil had been collected from a wall-mounted transformer in this building; however, during previous site work, this transformer had been removed and the contamination is no longer a concern. Mercury contamination is below RDCSRS criteria, and has not been identified as elemental in nature; therefore, no remediation related to this contaminant is proposed. ACM will be removed.

For ACM removal, refer to the evaluation criteria discussions in Section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work.

R-21

Building R-21 has PCBs in concrete and caulk, and arsenic in concrete and cinderblock above NJDEP non-RDCSRS criteria. ACM and LBP are also present in Building R-21. PCBs are above 10 ppm so decontamination needs to be attempted prior to sealing. Therefore, concrete will be decontaminated, the concrete slab and caulk will be encapsulated, and ACM and LBP removal will occur. Arsenic is assumed to be bound in the concrete so no remedial measures are proposed for it.

For PCB-contaminated structures, Alternative 2 provides good protection of human health and the environment as long as the integrity of the coating or seal used in encapsulation remains intact. This alternative would reduce the risk associated with direct human exposure to the contaminated concrete slab. However, if the coating or sealant used in encapsulation should wear or is disturbed during future building use, exposure to residual contamination is possible. Therefore, operations and maintenance activities are required; this includes periodic inspection of the seal.

For PCB-contaminated structures, chemical-specific and action-specific ARARs would be met. Under 40 CFR§761, appropriate off-site disposal is required for building waste material having contaminant concentrations that exceed the non-RDCSRS criteria. Based on the analytical results from the previous site investigations, the contaminant concentrations detected in the floor slab exceed this threshold. Therefore, if decontamination cannot achieve levels below non-RDCSRS criteria, then disposal will be the only option available. It is assumed that all location-specific ARARs (location near endangered species, wetlands, and secondary contact and indigenous aquatic life waters) would be met as work will be performed to avoid identified on-site environmentally sensitive areas. Since no demolition of site structures is involved, ARARs for historic preservation would also be met.

For PCB-contaminated structures, this alternative will not achieve long-term effectiveness and permanence because human exposure to the contaminated structure would only be reduced through the decontamination and encapsulation of the contaminated concrete. However, the level of decontamination may vary based on different material porosities, or leaching of PCBs back to the surface of the materials may result in the risk of exposure if the coating or encapsulating seal is compromised.

Under this alternative, there would not be a reduction of toxicity or volume but mobility will decrease through treatment of PCB-contaminated structures. The possibility also exists that decontamination methods may remove PCB concentrations to below regulatory levels. Short-term effectiveness is good under Alternative 2 since effects on human health and the environment during its construction and implementation phase can be controlled by professionals trained in the remedial technique.

For ACM and LBP removal, refer to the evaluation criteria discussions in Section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work.

Pump House 3 (P-3)

The only contamination observed in the Pump House 3 (P-3) during site investigations included the presence of LBP. Since Pump House 3 has been identified by E & E as a building that will not likely be reused, no abatement of the LBP would be performed. Restricting entry to the building would ensure adequate protection of human health and the environment.

Test Stand 3 (R-3)

The only contamination observed at Test Stand 3 (R-3) during site investigations was the presence of LBP. LBP is not addressed under CERCLA and disturbance of the material is not required to perform work. Since Test Stand 3 has been identified by E & E as a structure that is not fit for reuse, no abatement of the LBP would be performed. Restricting access to the structure would ensure adequate protection of human health and the environment.

Pump House 4 (P-4)

No contamination has been observed at Pump House 4 (P-4); therefore, no work is proposed at this site under OU3. Under Alternative 2, Pump House 4 will remain in its existing condition and is protective of human health and the environment.

R-51

Metals contamination above NJDEP non-RDCSRS criteria for arsenic and lead was observed at Building R-51. The presence of ACM and LBP was also veri-

fied. Volatile organic compound (VOC)-contaminated sludge from the adjacent AST, T-51, was identified in past site investigations; however, during previous site work this AST was removed and this contamination is no longer a concern. Since ACM is not addressed under CERCLA and disturbance of the material is not required to perform work, abatement is not required. However, since the building was identified by E & E as having potential reuse value, for the purposes of this document it is assumed that removal of ACM, as well as LBP, will be performed. The metals are assumed to be bound in the concrete so no remedial measures related to them are proposed.

For ACM and LBP removal, refer to the evaluation criteria discussions in Section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work.

Test Stand 4 (R-4)

NJDEP non-RDCSRS criteria for arsenic, lead, and PCBs were exceeded in concrete at Test Stand 4. Test Stand 4 also has ACM and LBP present. Under Alternative 2, ACM and LBP removal will occur followed by decontamination and encapsulation of the concrete slab. The metals are assumed bound in the concrete so no remedial measures related to them are proposed.

For PCB-contaminated structures, Alternative 2 provides good protection of human health and the environment as long as the integrity of the coating or seal used in encapsulation remains intact. This alternative would reduce the risk associated with direct human exposure to the contaminated concrete slab. However, if the coating or sealant used in encapsulation should wear or is disturbed during future building use, exposure to residual contamination is possible. Therefore, operations and maintenance activities are required, including periodic inspection of the seal.

For PCB-contaminated structures, chemical-specific and action-specific ARARs would be met. Under 40 CFR§761, appropriate off-site disposal is required for building waste material having contaminant concentrations that exceed the non-RDCSRS criteria. Based on the analytical results from the previous site investigations, the contaminant concentrations detected in the floor slab exceed this threshold. Therefore, if decontamination cannot achieve levels below non-RDCSRS criteria, then disposal will be the only option available. It is assumed that all location-specific ARARs (location near endangered species, wetlands, and secondary contact and indigenous aquatic life waters) would be met as work will be performed to avoid identified on-site environmentally sensitive areas. Since no demolition of site structures is involved, ARARs for historic preservation would also be met.

For PCB-contaminated structures, this alternative will not achieve long-term effectiveness and permanence because human exposure to the contaminated structure would only be reduced through the decontamination and encapsulation

of the contaminated concrete and cinderblock. However, the level of decontamination may vary based on different material porosities, or leaching of PCBs back to the surface of the materials may result in the risk of exposure if the coating or encapsulating seal is compromised.

Under this alternative, there would be no reduction of toxicity or volume through treatment of PCB-contaminated structures; however, mobility would be reduced through application of the encapsulant. Short-term effectiveness is good under Alternative 2, since effects on human health and the environment during its construction and implementation phase can be controlled by professionals trained in the remedial technique.

For PCB-contaminated structures, implementability is good since it employs common construction techniques with ample local contractors available to perform the work. Local contractors would be available for repair of any conditions that may affect the encapsulation effectiveness.

For ACM and LBP removal, refer to the evaluation criteria discussions in Section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work.

Water Tower Area

The presence of ACM and LBP were observed at both the Water Tower and the building associated with the Water Tower. However, as these structures were identified as having no future use no abatement is proposed.

Cistern/Cistern Pump

The only contamination detected at the Cistern/Cistern Pump during the site investigations included exceedances of the fresh water acute screening standard and the fresh water chronic screening standards for metals in samples collected from the surface water contained within the cisterns. Alternative 2 will include the extraction, containment, and off-site disposal of this contaminated surface water. Following pumping of the cistern, it will be inspected and, if necessary, removed from service to prevent future impacts.

This action will provide good protection of human health and the environment by removing contaminated surface water from the site.

This alternative would meet the chemical-specific ARARs for surface water (NJAC 7.9B). It is assumed that all location-specific ARARs (location near endangered species, wetlands, and secondary contact and indigenous aquatic life waters) would be met as work will be performed directly adjacent to the structure and work within environmentally sensitive areas identified on site will be avoided. Since no demolition of the structures is planned, ARARs for historic preservation are currently being met.

This alternative will achieve long-term effectiveness and permanence because exposure to the contaminated structure would be eliminated. The liquid would likely be hauled to a treatment facility so that a reduction of toxicity, volume, and mobility through treatment would be achieved on site; however, the risks associated with the contamination observed in the water within the Cistern will be transferred to the receiving facility until treatment is complete. Minimal short-term impacts associated with the remediation proposed at the Cistern/Cistern Pump include increased traffic on the local road to haul the material for disposal.

The alternative provides long-term effectiveness and permanence in that exposure to the contamination would be reduced through the removal and off-site disposal. Implementing the alternative is simple and local contractors would be available to perform the work required.

No. 2 Sewage Treatment Plant

Contamination observed at the No. 2 Sewage Treatment Plant during the site investigations included exceedances of the fresh water acute screening standard and the fresh water chronic screening standards for metals in samples collected from the surface water contained within the effluent tanks. Metals, VOCs, and pesticides were also observed in sludge collected from the treatment system. Alternative 2 will include the extraction, containment, and off-site disposal of this contaminated surface water and sludge and would provide good protection of human health and the environment. LBP was found on one of the treatment plant components. Since the LBP will not be disturbed during the performance of this work, abatement will not be performed.

The evaluation criteria discussions are identical to those presented above for Cistern/Cistern Pump.

Scrubber

No contamination associated with OU3 has been observed at the Scrubber and no work is proposed. Under Alternative 2, the Scrubber will remain in its existing condition and is protective of human health and the environment.

Water Cooling Tower

No industrial screening levels were exceeded at Water Cooling Tower during site investigations. The presence of ACM was verified. Since ACM is not addressed under CERCLA and disturbance of the material is not required to perform the work, abatement is not required.

Condenser and Hotwell

No contaminants above NJDEP non-RDCSRS criteria were identified at the Condenser and Hotwell site; therefore, no work is proposed under OU3. Under Alternative 2, the Condenser and Hotwell will remain in their existing condition and are protective of human health and the environment.

Transformer Bank

No contamination associated with OU3 has been observed at the Transformer Bank and no work is proposed. An evaluation of Alternative 2 against the criteria has not been performed for this structure.

Agitator and Effluent Treatment Basin

No contamination associated with OU3 has been observed at the Agitator and Effluent Basin and no work is proposed. An evaluation of Alternative 2 against the criteria has not been performed for this structure. Previous site investigations have shown metal exceedances in sediment from the basin; however, during the most recent field sampling events, no sediment was observed so this contamination source is no longer a concern.

4.1.3 Alternative 3: Demolition and Off-site Disposal

Under this alternative, selective building demolition and off-site waste disposal would be undertaken. This alternative includes either complete demolition of the structures or scarification of contaminated concrete surfaces (depending on their potential reuse value). This alternative also includes removal of source caulk and sealant material (containing PCB concentrations greater than 50 ppm); collection and disposal of contaminated surface water, oils, sludge, and sediment; and abatement of ACM and LBP. Abatement of LBP is only required for structures that have the potential for reuse, and abatement prior to demolition of a structure is not required as the bulk waste can be disposed of or recycled together under New Jersey regulations. This alternative assumes that non-hazardous debris that is scattered around many of the structures will only be removed if it is necessary for remedy implementation.

As with Alternative 2, it is assumed that all structures will be remediated to meet industrial risk screening levels or NJDEP Non-RDCSRS criteria for the occupancy rating presented in Table 3-1. The following is an analysis of Alternative 3 using the EPA evaluation criteria for each structure.

4.1.3.1 P2 Evaluation

R-47

R-47 contains PCB concentrations in the concrete slab floor that were well above the threshold for mandatory remedial bulk waste disposal as defined under 40 CFR§761. PCB contamination was also observed in samples collected from the cinderblock wall. Building R-47 contains ACM and LBP. Field observations indicated that R-47 is structurally sound and has potential reuse value; however, since cinderblock walls contain contamination and cannot be scarified, the entire building will be demolished. Therefore, ACM will be removed, the building will be demolished, and the remaining slab will be scarified to 1 inch in depth. Confirmation sampling will be used to determine if removal of additional concrete slab material is required. The foundation will be left in place as-is following remediation. Beneficial reuse of the demolished concrete is not possible due to

PCB exceedances. Any concrete removed from Building R-47 must be disposed of in a TSCA landfill/facility, and cinderblock removed from Building R-47 may be disposed of in a solid waste landfill/facility.

For PCB-contaminated structures, Alternative 3 provides good protection of human health and the environment. This alternative would reduce the risk associated with direct human exposure to the contaminated concrete slab and cinderblock walls in building R-47.

For PCB-contaminated structures, chemical-specific and action-specific ARARs would be met. Under 40 CFR§761, appropriate off-site disposal is required for building waste material having contaminant concentrations that exceed the non-RDCSRS criteria. Based on the analytical results from the previous site investigations, the contaminant concentrations detected in the floor slab and cinderblock walls at building R-47 exceed this threshold. It is assumed that all location-specific ARARs (location near endangered species, wetlands, and secondary contact and indigenous aquatic life waters) would be met as work will be performed to avoid identified on-site environmentally sensitive areas. Since demolition of site structures is involved, ARARs for historic preservation would not be met.

For PCB-contaminated structures, this alternative will achieve long-term effectiveness and permanence in that human exposure to the contaminated structure would be permanently reduced.

Under this alternative, there would be no reduction of toxicity, volume, and mobility through treatment of PCB-contaminated structures. Short-term effectiveness is good under Alternative 3 since effects on human health and the environment during the implementation phase can be controlled by professionals trained in the remedial technique.

For PCB-contaminated structures, this alternative employs common construction techniques with ample local contractors available to perform the work. The implementability is poor because of the number of trucks needed to haul the material off site.

For ACM and LBP removal, refer to the evaluation criteria discussions earlier in section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work.

Paint Locker

The Paint Locker contains arsenic in the concrete, benzo(a)pyrene in the cinderblock, and PCBs in caulk above industrial screening levels. LBP is also present. The paint locker will be demolished, and building materials will be hauled off site for disposal. The concrete slab may be left in place. Beneficial reuse of the demolished cinderblock is not possible due to the presence of PCB

caulk and SVOC exceedances. Therefore, cinderblock removed from the Paint Locker must be disposed of in a solid waste landfill/facility. Evaluation criteria will match that of Building R-47 above.

Fuel Storage Area

The Fuel Storage Area is currently a concrete foundation. Contamination has not been identified in the concrete slab; therefore, the Fuel Storage Area has not been evaluated further. Under Alternative 3, the Fuel Storage Area will remain in its existing condition and is protective of human health and the environment.

Igniter Storage

Contamination observed in the Igniter Storage bunker showed metals exceeding residential screening levels; no industrial screening levels were exceeded. The Igniter Storage bunker also included the presence of ACM and LBP. For the same reasons discussed under Alternative 2, it is assumed that removal of ACM and LBP will be performed. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work. The evaluation criteria will match Alternative 2.

Acid (Oxidizer) Storage Tank

Contamination has not been identified in the concrete slab of Acid (Oxidizer) Storage Tank area; therefore, it has not been evaluated further. Under Alternative 3, the Acid (Oxidizer) Storage Tank area will remain in its existing condition and is protective of human health and the environment.

Pump House 2 (P-2)

The only contamination observed in Pump House 2 (P-2) during site investigations included ACM. For the same reasons as discussed in Alternative 2, it is assumed that removal of ACM will not be performed. The evaluation criteria will match Alternative 2.

R-43

The only contamination observed in Building R-43 during site investigations was the presence of LBP. Since this structure has been identified by E & E as a building not fit for reuse, no abatement of the LBP would be performed. Restricting entry to the building would ensure adequate protection of human health and the environment.

R-34

Industrial screening levels were exceeded for the metals antimony, arsenic, and iron in concrete samples. The metals are all assumed to be bound within the matrix of the concrete, so no remedial measures are proposed to address the concrete. PCBs were identified in concrete and cinderblock at or above NJDEP RDCSRS criteria, but below NJDEP non-RDCSRS criteria, so no demolition is necessary. ACM and LBP are present within Building R-34. For the same reasons as discussed under Alternative 2, it is assumed that removal of ACM and

LBP will be performed. The oil observed in the wall-mounted transformer located inside building R-34 will also be extracted, containerized, and disposed of off site. Non-hazardous debris present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work. The evaluation criteria will match Alternative 2.

4.1.3.2 South Stand Area Evaluation

Test Stand 12

Removal management and industrial screening levels for PCBs were exceeded in a concrete and caulk sample at Test Stand 12, and ACM was verified at the structure. Alternative 3 will include the removal of ACM and non-hazardous debris, and the complete demolition and off-site disposal of Test Stand 12. Beneficial reuse of the demolished concrete is not possible due to PCB, metal, pesticide, and SVOC exceedances. Therefore, any concrete or cinderblock removed from Test Stand 12 must be disposed of in a solid waste landfill/facility.

For PCB-contaminated structures, Alternative 3 provides good protection of human health and the environment. This alternative would reduce the risk associated with direct human exposure to the contaminated concrete slab.

For PCB-contaminated structures, chemical-specific and action-specific ARARs would be met. Under 40 CFR §761, appropriate off-site disposal is required for building waste material having contaminant concentrations that exceed the non-RDCSRS criteria. Based on the analytical results from the previous site investigations, the contaminant concentrations detected in the concrete exceed this threshold. It is assumed that all location-specific ARARs (location near endangered species, wetlands, and secondary contact and indigenous aquatic life waters) would be met as work will be performed to avoid identified on-site environmentally sensitive areas. Since demolition of site structures is involved, ARARs for historic preservation would not be met.

For PCB-contaminated structures, this alternative will achieve long-term effectiveness and permanence in that human exposure to the contaminated structure would be permanently reduced.

Under this alternative, there would be no reduction of toxicity, volume, and mobility through treatment of PCB-contaminated structures. Short-term effectiveness is good under Alternative 3 since effects on human health and the environment during the implementation phase can be controlled by professionals trained in the remedial technique.

For PCB-contaminated structures, this alternative employs common construction techniques with ample local contractors available to perform the work. The implementability is poor because of the number of trucks needed to haul material off site.

For ACM removal, refer to the evaluation criteria discussions earlier in section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work.

S-46

Building S-46 concrete slab samples had industrial screening-level exceedances in concrete for PCBs, Dieldrin, and arsenic, and in cinderblock for arsenic and mercury. The metals are assumed to be bound within the concrete. Mercury contamination is below RDCSRS criteria and has not been identified as elemental in nature; therefore, no remediation related to this contaminant is proposed. PCBs in caulk were below residential screening levels and ACM and LBP are also present. Field observations indicated that S-46 is structurally sound and has potential reuse value. Therefore, ACM and LBP will be removed and the slab will be scarified to 1 inch in depth. Confirmation sampling will be used to determine if removal of additional concrete slab material is required. The foundation will be left in place as-is following remediation. Beneficial reuse of the demolished concrete is not possible due to the PCB, metal, and pesticide exceedances. Any concrete removed from Building S-46 must be disposed of in a TSCA landfill/facility.

For PCB-contaminated structures, Alternative 3 provides good protection of human health and the environment. This alternative would reduce the risk associated with direct human exposure to the contaminated concrete slab.

For PCB-contaminated structures, chemical-specific and action-specific ARARs would be met. Under 40 CFR §761, appropriate off-site disposal is required for building waste material having contaminant concentrations that exceed the non-RDCSRS criteria. Based on the analytical results from the previous site investigations, the contaminant concentrations detected in the floor slab exceed this threshold. It is assumed that all location-specific ARARs (location near endangered species, wetlands, and secondary contact and indigenous aquatic life waters) would be met as work will be performed to avoid identified on-site environmentally sensitive areas. Since demolition of site structures is not involved, ARARs for historic preservation would be met.

For PCB-contaminated structures, this alternative will achieve long-term effectiveness and permanence in that human exposure to the contaminated structure would be permanently reduced.

Under this alternative, there would be no reduction of toxicity, volume, and mobility through treatment of PCB-contaminated structures. Short-term effectiveness is good under Alternative 3 since effects on human health and the environment during the implementation phase can be controlled by professionals trained in the remedial technique.

For PCB-contaminated structures, this alternative employs common construction techniques with ample local contractors available to perform the work. The number of trucks needed to haul material off site will be less than if the whole building was being demolished.

For ACM and LBP removal, refer to the evaluation criteria discussions earlier in section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work.

Test Stand 11 (S-11)

No contamination was observed at Test Stand 11 during site investigations but the presence of ACM was verified. For the same reasons discussed in Alternative 2, it is assumed that removal of ACM will not be performed.

Test Stand 37 (S-37)

Industrial screening levels for arsenic were detected in concrete and cinderblock samples. Arsenic is assumed bound in the concrete so no remedial measures are proposed. The presence of ACM was also verified at Test Stand 37. For the same reasons discussed in Alternative 2, it is assumed that removal of ACM will not be performed.

Propane Storage Area

No investigations have been performed at the Propane Storage Area. No work is proposed at this site under OU3 and therefore evaluation of Alternative 3 against the criteria has not been performed for this area.

No. 1 Sewage Treatment Plant

No contamination has been observed in the concrete or building materials investigated at this site; therefore, the No. 1 Sewage Treatment Plant has not been evaluated further. Under Alternative 3, the No. 1 Sewage Treatment Plant will remain in its existing condition and is protective of human health and the environment.

S-48

Contamination observed at Building S-48 during previous site investigations included the presence of ACM and LBP. However, the building has been completely removed during previous activities at the RTI Superfund site, and these sources of contamination are no longer of concern. During the RI, metals in the concrete were found to exceed residential screening levels only; therefore, no additional work is proposed at this site under OU3. Under Alternative 3, Building S-48 will remain in its existing condition and is protective of human health and the environment.

T-50

No contamination has been observed in the concrete pad. Therefore, the area has not been evaluated further and no work is proposed at this site under OU3. Under

Alternative 3, Building T-50 will remain in its existing condition and is protective of human health and the environment.

S-49

No contamination has been observed in the concrete pad. Therefore, the area has not been evaluated further and no work is proposed at this site under OU3. Under Alternative 3, Building S-49 will remain in its existing condition and is protective of human health and the environment.

4.1.3.3 East Stand Area Evaluation

Test Stand 2 (R-2)

No contamination above industrial screening levels was observed at Test Stand 2 during site investigations but the presence of ACM was verified. The PCB concentration was below the state Non-Residential DCSRS threshold of 1 ppm, and EPA TSCA regulations do not define PCB criteria below 1 ppm. LBP was also observed at this structure. Remediation of the concrete and abatement of ACM or LBP is not considered necessary as this structure has been determined to have no future reuse for the same rationale as discussed under Alternative 2.

R-33

Cobalt exceeded residential screening levels, but no further contamination has been observed in Building R-33. LBP was identified in Building R-33. Under Alternative 3, Building R-33 will require LBP removal; refer to the evaluation criteria discussions presented in Section 4.1.2.

R-29

Mercury contamination above industrial screening levels was observed in the concrete slab at Building R-29, and the presence of ACM was verified. PCB-oil had been collected from a wall-mounted transformer in this building; however, during previous site work this transformer had been removed and this contamination is no longer a concern. Since mercury contamination is well below RDCSRS and Non-RDCSRS criteria and it is not elemental in nature, no remediation related to this contaminant is proposed. For the same reasons discussed in Alternative 2, it is assumed that removal of ACM will be performed. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work. The evaluation criteria will match Alternative 2.

R-21

Building R-21 has PCBs in concrete and caulk, and arsenic in concrete and cinderblock above industrial screening levels. ACM and LBP are also present in Building R-21. Arsenic is assumed bound in the concrete so no remedial measures related to it are proposed. Alternative 3 for Building R-21 includes ACM and LBP removal, removal and disposal of miscellaneous debris, scarification and off-site disposal of contaminated concrete slab material, and removal and off-site disposal of contaminated caulk. The building will not be demolished.

The slab will be scarified to 1 inch in depth with confirmation sampling to determine if removal of additional foundation material is required. Beneficial reuse of the demolished concrete is not possible due to the PCB and metals exceedances. Waste material from R-21 may be disposed of in a solid waste landfill/facility.

For PCB-contaminated structures, Alternative 3 provides good protection of human health and the environment. This alternative would reduce the risk associated with direct human exposure to the contaminated concrete slab.

For PCB-contaminated structures, chemical-specific and action-specific ARARs would be met. Under 40 CFR §761, appropriate off-site disposal is required for building waste material having contaminant concentrations that exceed the non-RDCSRS criteria. Based on the analytical results from the previous site investigations, the contaminant concentrations detected in the floor slab exceed this threshold. It is assumed that all location-specific ARARs (location near endangered species, wetlands, and secondary contact and indigenous aquatic life waters) would be met as work will be performed to avoid identified on-site environmentally sensitive areas. Since demolition of site structures is not involved, ARARs for historic preservation would be met.

For PCB-contaminated structures, this alternative will achieve long-term effectiveness and permanence because human exposure to the contaminated structure would be permanently reduced.

Under this alternative, there would be no reduction of toxicity, volume, and mobility through treatment of PCB-contaminated structures. Short-term effectiveness is good under Alternative 3 since effects on human health and the environment during the implementation phase can be controlled by professionals trained in the remedial technique.

For PCB-contaminated structures, this alternative employs common construction techniques with ample local contractors available to perform the work. The number of trucks needed to haul material off site will be less than if the whole building was being demolished.

For ACM and LBP removal, refer to the evaluation criteria discussions earlier in Section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work.

Pump House 3 (P-3)

The only contamination observed in the Pump House 3 (P-3) during the site investigations was the presence of LBP. Since Pump House 3 has been identified by E & E as a building that will not likely be reused, no abatement of the LBP would be performed. Restricting entry to the building would ensure adequate protection of human health and the environment.

Test Stand 3 (R-3)

The only contamination observed at Test Stand 3 (R-3) during site investigations included the presence of LBP. LBP is not addressed under CERCLA and disturbance of the material is not required to perform work. Since Test Stand 3 has been identified by E & E as a structure that is not fit for reuse, no abatement of the LBP would be performed. Restricting access to the structure would ensure adequate protection of human health and the environment. Two empty ASTs were also observed in the vicinity of the structure, these tanks will be removed from the site and recycled or disposed of as appropriate.

Pump House 4 (P-4)

No contamination has been observed at Pump House 4 (P-4); therefore, no work is proposed at this site under OU3. Under Alternative 3, Pump House 4 will remain in its existing condition and is protective of human health and the environment.

R-51

Metals contamination above industrial screening levels for arsenic and lead was observed at Building R-51. The presence of ACM and LBP were also verified. VOC-contaminated sludge from the adjacent AST, T-51, was identified in past site investigations; however, during previous site work this AST had been removed and this contamination is no longer a concern. The metals are assumed to be bound in the concrete so no remedial measures are proposed. For the same reasons discussed in Alternative 2 it is assumed that removal of ACM and LBP will be performed. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work. The evaluation criteria will match Alternative 2.

Test Stand 4 (R-4)

Industrial screening levels for arsenic, lead, and PCBs were exceeded in concrete at Test Stand 4. PCB contamination was observed in the concrete slab in concentrations that exceeded the RDCSRS and non-RDCSRS screening standards. ACM and LBP contamination were also identified at Test Stand 4. Under Alternative 3, it is proposed that the contaminated concrete slab at Test Stand 4 (R-4) be scarified and disposed of off site at a solid waste landfill following ACM and LBP removal. The metals are assumed bound in the concrete so no remedial measures are proposed. Alternative 3 provides protection of human health and the environment and reduces the risk associated with future direct human exposure to the PCB contamination.

For PCB-contaminated structures, Alternative 3 provides good protection of human health and the environment. This alternative would reduce the risk associated with direct human exposure to the contaminated concrete slab.

For PCB-contaminated structures, chemical-specific and action-specific ARARs would be met. Under 40 CFR §761, appropriate off-site disposal is required for

building waste material having contaminant concentrations that exceed the non-RDCSRS criteria. Based on the analytical results from the previous site investigations, the contaminant concentrations detected in the floor slab exceed this threshold. It is assumed that all location-specific ARARs (location near endangered species, wetlands, and secondary contact and indigenous aquatic life waters) would be met as work will be performed to avoid identified on-site environmentally sensitive areas. Since demolition of site structures is not involved, ARARs for historic preservation would be met.

For PCB-contaminated structures, this alternative will achieve long-term effectiveness and permanence in that human exposure to the contaminated structure would be permanently reduced.

Under this alternative, there would be no reduction of toxicity, volume, and mobility through treatment of PCB-contaminated structures. Short-term effectiveness is good under Alternative 3 since effects on human health and the environment during the implementation phase can be controlled by professionals trained in the remedial technique.

For PCB-contaminated structures, this alternative employs common construction techniques with ample local contractors available to perform the work. The number of trucks needed to haul material off site will be less than if the whole building was being demolished.

For ACM and LBP removal, refer to the evaluation criteria discussions in Section 4.1.2. Non-hazardous debris that is present within this structure will be removed and disposed of in a solid waste landfill in order to gain access for work.

Water Tower Area

The presence of ACM and LBP were verified at both the Water Tower and the Building associated with the Water Tower; however, these structures have been identified by E & E as not fit for reuse. No abatement of the ACM or LBP would be performed.

Cistern/Cistern Pump

The only contamination observed at the Cistern/Cistern Pump during site investigations included exceedances of the fresh water acute screening standard and the fresh water chronic screening standards for metals in samples collected from the surface water contained within the cisterns. Alternative 3 will include the extraction, containment, and off-site disposal of this contaminated surface water. The evaluation criteria will match Alternative 2.

No. 2 Sewage Treatment Plant

Contamination observed at the No. 2 Sewage Treatment Plant during site investigations included exceedances of the fresh water acute screening standard and the fresh water chronic screening standards for metals in samples collected from the

surface water contained within the effluent tanks. Metals, VOCs, and pesticides were also observed in sludge collected from the treatment system. Alternative 3 will include the extraction, containment, and off-site disposal of this contaminated surface water and sludge. Demolition of the concrete slab foundation would not be required. Since the LBP will not be disturbed during the performance of this work, abatement will not be performed. The evaluation criteria will match Alternative 2.

Scrubber

No contamination associated with OU3 has been observed at the Scrubber and no work is proposed. Under Alternative 3, the Scrubber will remain in its existing condition and it is protective of human health and the environment.

Water Cooling Tower

No industrial screening levels were exceeded at Water Cooling Tower during site investigations. The presence of ACM was verified. For the same reasons discussed in Alternative 2, it is assumed that removal of ACM will not be performed.

Condenser and Hotwell

No contaminants above industrial screening levels were identified at the Condenser and Hotwell site; therefore, no work is proposed under OU3. Under Alternative 3, the Condenser and Hotwell will remain in its existing condition and it is protective of human health and the environment.

Transformer Bank

No contamination associated with OU3 has been observed at the Transformer Bank and no work is proposed. An evaluation of Alternative 3 against the criteria has not been performed for this structure.

Agitator and Effluent Treatment Basin

No contamination associated with OU3 has been observed at the Agitator and Effluent Treatment Basin and no work is proposed. An evaluation of Alternative 3 against the criteria has not been performed for this structure. Previous site investigations have shown metal exceedances in sediment from the basin; however, during the most recent field sampling events, no sediment was observed.

4.2 Comparative Analysis of Alternatives

In this subsection, the three remedial action alternatives are evaluated against one another using the seven EPA criteria described at the beginning of this section. A detailed analysis of each alternative evaluated against these criteria for the individual buildings is provided above. Table 4-2 presents a summary of the comparative analysis of alternatives.

4.2.1 Overall Protection of Human Health and the Environment

With the exception of Alternative 1, No Action, the other two remedial action alternatives provide some level of protection. Alternative 2 and Alternative 3 have similar approaches in dealing with the remediation of ACM and LBP material identified within the buildings at the site; for buildings that only contained ACM and/or LBP contamination, the level of protection was the same for both alternatives. In general, Alternative 3 (complete demolition and off-site disposal of demolition wastes) would provide the greatest level of protection of human health and the environment at each of the buildings identified as having PCB contamination in the concrete slab, cinderblock, or caulk, as the contamination will be removed from the RTI Superfund site.

4.2.2 Compliance with ARARs

With the exception of the no-action alternative, which does not meet ARARs, the two remaining alternatives can be conducted such that ARARs would be met. All chemical-specific, location-specific, and action-specific ARARs can be met for Alternatives 2 and 3.

For buildings containing contaminated caulk with PCB concentrations above 50 ppm, both Alternative 2 and Alternative 3 meet the chemical-specific ARARs due to the disposal requirements. Additionally, both Alternative 2 and Alternative 3 meet the ARARs for concrete or cinderblocks with concentrations above 100 ppm. Both alternatives meet ARARs for ACM and LBP abatement.

4.2.3 Long-Term Effectiveness and Permanence

While Alternative 1 (No Action) provides no long-term effectiveness or permanence, the remaining alternatives would provide some level of long-term effectiveness, assuming proper O&M of the encapsulation coatings. Alternative 3 offers more permanence than Alternative 2 as the contaminated material is completely removed from the site and no further O&M is required.

4.2.4 Reduction of Toxicity, Mobility, and Volume Through Treatment

Alternative 2 will not reduce the toxicity or volume of the waste through treatment. Alternative 3 does not reduce the toxicity or volume since it just removes PCBs from the site to another location, but it does reduce its potential for mobility. Mobility is also inhibited further under Alternative 2 as it prevents surface-bleeding or further infiltration of PCB contamination into the porous surface of concrete, cinderblock, or other adjacent building materials.

4.2.5 Short-Term Effectiveness

The no-action alternative would have the least short-term impact in that nothing would be implemented or constructed. The short-term impacts posed by Alternative 2 would be less significant than the Alternative 3 because this alternative involves less demolition, transportation, and disposal of contaminated wastes. Most of the short-term impacts for remediation of the RTI Superfund site are

associated with noise, dust, and traffic associated with demolishing and disposing of site materials. Alternative 3 has greatest short-term impacts.

4.2.6 Implementability

Of the three alternatives, Alternative 1 (No Action) is the most implementable. Alternative 2 is the next most readily implementable alternative since it involves the least amount of concrete demolition. Alternative 3, although relatively simple to implement due to the use of common demolition equipment and methods, will involve the most coordination. Alternative 2 and Alternative 3 both require specialized contractors to perform any ACM and LBP abatement.

4.2.7 Costs

Under this section, the costs associated with implementing the alternatives are compared against each other. Using the present worth value for each alternative, Alternative 2 is the most expensive, having a present worth cost of $2,570,000, because of long-term O&M that will be required to ensure that the integrity of the encapsulant remains intact. Alternative 3 is a less expensive alternative, having a present worth cost of $2,010,000. For Alternative 1, there are no costs. Table 4-3 provides a summary of costs for each alternative at each structure within the OU3 site (i.e., P2, South Stand Area, and East Stand Area). Appendix A contains cost estimate tables showing the cost for remediation of individual structures based on alternative.

4.2.8 State Acceptance

To be addressed in the ROD.

4.2.9 Community Acceptance

To be addressed in the ROD.

Table 4-1 Individual Analysis of Alternatives
Focused Feasibility Study, OU3 Radiation Technology Superfund Site, Rockaway Township, New Jersey

Remedial Alternative	Evaluation Criteria: Protection of Human Health and the Environment	Compliance with ARARs	Short-Term Impacts and Effectiveness	Long-Term Effectiveness and Permanence	Reduction in Toxicity, Mobility, and Volume	Implementability	Cost* Construction, 30-Year O&M, Total
P-2 Area							
Alternative 1: No Action	No additional protection provided.	Does not comply.	No short-term impacts.	Does not provide any effectiveness or permanence.	No reduction achieved.	Readily implementable.	$0 $0 $0
Alternative 2: Chemical Cleaning and Encapsulation	Provides protection of human health and the environment as long as the integrity of the encapsulant remains.	Can be designed to meet ARARs. Under 40 CFR § 761, if decontamination cannot achieve levels below non-RDCSRS criteria, disposal will be the only option available	Short-term impacts include increased dust generation during cleaning and ACM and LBP abatement. Impacts can be controlled by professionals trained in the remedial technique	Provides limited effectiveness and permanence. O&M required to ensure integrity of sealant/cover	No reduction in toxicity and volume; potential reduction in mobility	Readily implementable.	$719,000 $459,000 $1,170,000
Alternative 3: Building Waste Demolition and Off-Site Disposal	Provides protection of human health and environmental protection. Contamination is transferred off site and not treated or destroyed.	Can be designed to meet ARARs.	Considerable adverse impacts during construction associated with the demolition of concrete (increases in noise, dust, debris, traffic, etc.) and with ACM and LBP abatement. Short-term impacts greater than Alt. 2.	Provides long-term effectiveness and permanence.	No reduction in volume, toxicity, and mobility through decontamination/treatment.	Readily implementable. However, large volumes of building material waste may be generated.	$753,000 $0 $750,000

Table 4-1 Individual Analysis of Alternatives
Focused Feasibility Study, OU3 Radiation Technology Superfund Site, Rockaway Township, New Jersey

Remedial Alternative	Evaluation Criteria: Protection of Human Health and the Environment	Compliance with ARARs	Short-Term Impacts and Effectiveness	Long-Term Effectiveness and Permanence	Reduction in Toxicity, Mobility, and Volume	Implementability	Cost* Construction, 30-Year O&M, Total
South Stand Area							
Alternative 1: No Action	No additional protection provided.	Does not comply.	No short-term impacts.	Does not provide any effectiveness or permanence.	No reduction achieved.	Readily implementable.	$0 $0 $0
Alternative 2: Chemical Cleaning and Encapsulation	Provides protection of human health and the environment as long as the integrity of the encapsulant remains.	Can be designed to meet ARARs. Under 40 CFR § 761, if decontamination cannot achieve levels below non-RDCSRS criteria, disposal will be the only option available	Short-term impacts include increased dust generation during cleaning and ACM and LBP abatement. Impacts can be controlled by professionals trained in the remedial technique	Provides limited effectiveness and permanence. O&M required to ensure integrity of sealant/cover	No reduction in toxicity and volume; potential reduction in mobility.	Readily implementable.	$281,000 $199,000 $480,000
Alternative 3: Building Waste Demolition and Off-Site Disposal	Provides protection of human health and limited environmental protection. Contamination is transferred off site and not treated or destroyed.	Can be designed to meet ARARs.	Considerable adverse impacts during construction associated with the demolition of concrete (increases in noise, dust, debris, traffic, etc.) and with ACM and LBP abatement. Short-term impacts greater than Alt. 2.	Provides long-term effectiveness and permanence.	No reduction in volume, toxicity and mobility.	Readily implementable. However, large volumes of building material waste may be generated.	$656,000 $0 $660,000

Table 4-1 Individual Analysis of Alternatives
Focused Feasibility Study, OU3 Radiation Technology Superfund Site, Rockaway Township, New Jersey

Remedial Alternative	Evaluation Criteria: Protection of Human Health and the Environment	Compliance with ARARs	Short-Term Impacts and Effectiveness	Long-Term Effectiveness and Permanence	Reduction in Toxicity, Mobility, and Volume	Implementability	Cost* Construction, 30-Year O&M, Total
East Stand Area							
Alternative 1: No Action	No additional protection provided.	Does not comply.	No short-term impacts.	Does not provide any effectiveness or permanence.	No reduction achieved.	Readily implementable.	$0 $0 $0
Alternative 2: Chemical Cleaning and Encapsulation	Provides protection of human health and the environment as long as the integrity of the encapsulant remains.	Can be designed to meet ARARs. Under 40 CFR § 761, if decontamination cannot achieve levels below non-RDCSRS criteria, disposal will be the only option available	Short-term impacts include increased dust generation during cleaning and ACM and LBP abatement. Impacts can be controlled by professionals trained in the remedial technique	Provides limited effectiveness and permanence. O&M required to ensure integrity of sealant/cover	No reduction in toxicity and volume; potential reduction in mobility	Readily implementable.	$545,000 $372,000 $920,000
Alternative 3: Building Waste Demolition and Off-Site Disposal	Provides protection of human health and environmental protection. Contamination is transferred off site and not treated or destroyed.	Can be designed to meet ARARs.	Considerable adverse impacts during construction associated with the demolition of concrete (increases in noise, dust, debris, traffic, etc.) and with ACM and LBP abatement. Short-term impacts greater than Alt. 2.	Provides long-term effectiveness and permanence.	No reduction in volume, toxicity and mobility.	Readily implementable. However, large volumes of building material waste may be generated.	$590,000 $0 $600,000

* Costs rounded to nearest $10,000.

Table 4-2 Summary Comparative Analysis of Alternatives
Focused Feasibility Study, OU3 Radiation Technology Superfund Site, Rockaway Township, New Jersey

Remedial Alternative	Evaluation Criteria						
	Protection of Human Health and the Environment	Compliance with ARARs	Short-Term Impacts and Effectiveness	Long-Term Effectiveness and Permanence	Reduction in Toxicity, Mobility, and Volume	Implementability	Cost
Alternative 1: No Action	Provides no increased protection and is least protective overall.	Provides no compliance.	Provides no short-term impacts.	Provides no long-term effectiveness.	No reduction is achieved.	The site remains the same; therefore, most implementable.	No cost associated with this alternative.
Alternative 2: Chemical Cleaning and Encapsulation	More protective than Alt. 1; provides limited protection to the environment. PCB contamination in concrete remains on site as long as encapsulant remains intact.	Compliant with ARARs.	Minimal adverse impacts in the short term associated with ACM and LBP abatement. Involves less demolition, transportation, and disposal of contaminated waste.	Limited effectiveness in the long-term, and does not offer permanence.	No reduction in toxicity and volume; potential reduction in mobility with encapsulant.	Readily implementable. Requires specialized contractors to perform ACM and LBP abatement.	Alternative 2 is more expensive than Alternative 3
Alternative 3: Building Waste Demolition and Off-Site Disposal	Provides the most on-site human health protection and is more protective of the environment than Alt. 2 as it removes all contamination associated with OU3 from the site.	Compliant with ARARs.	Considerable adverse impacts during construction associated with the demolition of concrete (increases in noise, dust, debris, traffic, etc.) and with ACM and LBP abatement. Short-term impacts greater than Alt. 2.	Provides long-term effectiveness and permanence.	No reduction in volume, toxicity and mobility.	Readily implementable. However, large volumes of building material waste may be generated. Requires more coordination than Alt. 2, and specialized contractors for ACM and LBP abatement.	Alternative 3 is less expensive than Alternative 2.

**Table 4-3 Comparative Summary of Alternative Costs
Focused Feasibility Study, OU3 Radiation Technology Superfund Site, Rockaway Township, New Jersey**

Alt.	Description	Capital Cost[1]	O&M Cost[1]	Alternative Cost[2]
P2-Area				
1	No Action	$0	$0	$0
2	Chemical Cleaning and Encapsulation	$719,000	$459,000	$1,170,000
3	Building Waste Demolition and Off-Site Disposal	$753,000	$0	$750,000
South Stand Area				
1	No Action	$0	$0	$0
2	Chemical Cleaning and Encapsulation	$281,000	$199,000	$480,000
3	Building Waste Demolition and Off-Site Disposal	$656,000	$0	$660,000
East Stand Area				
1	No Action	$0	$0	$0
2	Chemical Cleaning and Encapsulation	$545,000	$372,000	$920,000
3	Building Waste Demolition and Off-Site Disposal	$590,000	$0	$600,000

[1] Rounded to nearest $1,000.
[2] Rounded to nearest $10,000.

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A Cost Estimate Tables

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Table A-1A **Preliminary Construction Cost Estimate**
Alternative 2 (Encapsulation) - P2 Area Building R-47
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	2.1	MO	$ 67,300	$ 141,330
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	0	SF	$ 8	$ -
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	18,465	SF	$ 13	$ 241,366.93
C2h	Light Ballast Removal	12	EA	$ 41	$ 494
C2i	Refrigerant Removal	1	EA	$ 993	$ 993
C2j	Asbestos Abatement	1	LS	$ 22,290	$ 22,290
C2k	Lead Based Paint Abatement	24	SF	$ 30	$ 716
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	0	LF	$ 53	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 425,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 21,250
	Professional/Tech. - Remedial Design	6%			$ 25,500
	Professional/Tech. - Construction Mgmt	4%			$ 17,000
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 64,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 489,000*
	Contingency Allowance	20%			$ 97,800
Total Capital Cost (Rounded to Nearest $1,000)					**$ 587,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	1	Each	$ 9,800	$ 9,800
O1b	Encapsulation Restoration	185	SF	$ 40	$ 7,400
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ 17,000*
Annual Indirect O&M Costs					
	Administration	5%			$ 850
	Insurance, Taxes, Licenses	3%			$ 425
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ 1,000*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ 18,000*
	Contingency Allowance	25%			$ 4,500
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ 23,000**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 587,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ 285,000
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 870,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-1B **Preliminary Construction Cost Estimate**
Alternative 3 (Demolition and Offsite Disposal) - P2 Area Building R-47
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	1.5	MO	$ 67,300	$ 101,514
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	10257	SF	$ 13	$ 133,341
C2d	Cinderblock Wall Demolition	8,208	SF	$ 10	$ 82,080
C2e	Miscellaneous Debris and C&D Demolition	10,257	SF	$ 8	$ 82,056
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	0	SF	$ 13	$ -
C2h	Light Ballast Removal	12	EA	$ 41	$ 494
C2i	Refrigerant Removal	1	EA	$ 993	$ 993
C2j	Asbestos Abatement	1	LS	$ 22,290	$ 22,290
C2k	Lead Based Paint Abatement	24	SF	$ 30	$ 716
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	0	LF	$ 53	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 441,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 22,050
	Professional/Tech. - Remedial Design	6%			$ 26,460
	Professional/Tech. - Construction Mgmt	4%			$ 17,640
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 66,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 507,000*
	Contingency Allowance	20%			$ 101,400
Total Capital Cost (Rounded to Nearest $1,000)					**$ 608,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	0	Each	$ 9,800	$ -
O1b	Encapsulation Restoration	0	SF	$ 40	$ -
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ -*
Annual Indirect O&M Costs					
	Administration	5%			$ -
	Insurance, Taxes, Licenses	3%			$ -
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ -*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ -*
	Contingency Allowance	25%			$ -
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ -**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 608,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ -
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 610,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-2A **Preliminary Construction Cost Estimate**
Alternative 2 - P2 Area: Paint Locker
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.1	MO	$ 67,300	$ 8,973
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	0	SF	$ 8	$ -
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	1,200	SF	$ 13	$ 15,686
C2h	Light Ballast Removal	1	EA	$ 41	$ 41
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ -	$ -
C2k	Lead Based Paint Abatement	24	SF	$ 30	$ 716
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	0	LF	$ 53	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 43,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 2,150
	Professional/Tech. - Remedial Design	6%			$ 2,580
	Professional/Tech. - Construction Mgmt.	4%			$ 1,720
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 6,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 49,000*
	Contingency Allowance	20%			$ 9,800
Total Capital Cost (Rounded to Nearest $1,000)					**$ 59,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	1	Each	$ 9,800	$ 9,800
O1b	Encapsulation Restoration	12	SF	$ 40	$ 480
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ 10,000*
Annual Indirect O&M Costs					
	Administration	5%			$ 500
	Insurance, Taxes, Licenses	3%			$ 250
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ 1,000*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ 11,000*
	Contingency Allowance	25%			$ 2,750
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ 14,000**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 59,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ 174,000
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 230,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-2B **Preliminary Construction Cost Estimate**
Alternative 3 - P2 Area: Paint Locker
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.2	MO	$ 67,300	$ 11,876
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	1,200	SF	$ 10	$ 12,000
C2e	Miscellaneous Debris and C&D Demolition	1,200	SF	$ 8	$ 9,600
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	0	SF	$ 13	$ -
C2h	Light Ballast Removal	1	EA	$ 41	$ 41
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ -	$ -
C2k	Lead Based Paint Abatement	24	SF	$ 30	$ 716
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	0	LF	$ 53	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 52,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 2,600
	Professional/Tech. - Remedial Design	6%			$ 3,120
	Professional/Tech. - Construction Mgmt	4%			$ 2,080
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 8,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 60,000*
	Contingency Allowance	20%			$ 12,000
Total Capital Cost (Rounded to Nearest $1,000)					**$ 72,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	0	Each	$ 9,800	$ -
O1b	Encapsulation Restoration	0	SF	$ 40	$ -
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ -*
Annual Indirect O&M Costs					
	Administration	5%			$ -
	Insurance, Taxes, Licenses	3%			$ -
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ -*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ -*
	Contingency Allowance	25%			$ -
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ -**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 72,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ -
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 70,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-3 **Preliminary Construction Cost Estimate**
Alternative 2 & 3 - P2 Area: Ignitor Storage
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.05	MO	$ 67,300	$ 3,365
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	0	SF	$ 8	$ -
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	0	SF	$ 13	$ -
C2h	Light Ballast Removal	1	EA	$ 41	$ 41
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ 5	$ 5
C2k	Lead Based Paint Abatement	24	SF	$ 30	$ 716
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	0	LF	$ 53	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 22,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 1,100
	Professional/Tech. - Remedial Design	6%			$ 1,320
	Professional/Tech. - Construction Mgmt	4%			$ 880
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 3,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 25,000*
	Contingency Allowance	20%			$ 5,000
Total Capital Cost (Rounded to Nearest $1,000)					**$ 30,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	0	Each	$ 9,800	$ -
O1b	Encapsulation Restoration	0	SF	$ 40	$ -
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ -*
Annual Indirect O&M Costs					
	Administration	5%			$ -
	Insurance, Taxes, Licenses	3%			$ -
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ -*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ -*
	Contingency Allowance	25%			$ -
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ -**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 30,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ -
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 30,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-4 **Preliminary Construction Cost Estimate**
Alternative 2&3 - P2 Area: Building R-34
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.1	MO	$ 67,300	$ 6,730
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	0	SF	$ 8	$ -
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	0	SF	$ 13	$ -
C2h	Light Ballast Removal	0	EA	$ 41	$ -
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ 6,400	$ 6,400
C2k	Lead Based Paint Abatement	1	SF	$ 30	$ 30
C2l	Oil Disposal	1	Drum	$ 373	$ 373
C2m	Institutional Controls	0	LF	$ 53	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 31,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 1,550
	Professional/Tech. - Remedial Design	6%			$ 1,860
	Professional/Tech. - Construction Mgmt	4%			$ 1,240
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 5,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 36,000*
	Contingency Allowance	20%			$ 7,200
Total Capital Cost (Rounded to Nearest $1,000)					**$ 43,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	0	Each	$ 9,800	$ -
O1b	Encapsulation Restoration	0	SF	$ 40	$ -
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ -*
Annual Indirect O&M Costs					
	Administration	5%			$ -
	Insurance, Taxes, Licenses	3%			$ -
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ -*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ -*
	Contingency Allowance	25%			$ -
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ -**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 43,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ -
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 40,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-5A **Preliminary Construction Cost Estimate**
Alternative 2 - South Stand Area: Test Stand 12 (S-12)
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.3	MO	$ 67,300	$ 16,825
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	0	SF	$ 8	$ -
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	0	SF	$ 13	$ -
C2h	Light Ballast Removal	6	EA	$ 41	$ 246.87
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ 10,330	$ 10,330
C2k	Lead Based Paint Abatement	0	SF	$ 30	$ -
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	400	LF	$ 53	$ 21,171
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 66,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 3,300
	Professional/Tech. - Remedial Design	6%			$ 3,960
	Professional/Tech. - Construction Mgmt	4%			$ 2,640
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 10,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 76,000*
	Contingency Allowance	20%			$ 15,200
Total Capital Cost (Rounded to Nearest $1,000)					**$ 91,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	0	Each	$ 9,800	$ -
O1b	Encapsulation Restoration	0	SF	$ 40	$ -
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ -*
Annual Indirect O&M Costs					
	Administration	5%			$ -
	Insurance, Taxes, Licenses	3%			$ -
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ -*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ -*
	Contingency Allowance	25%			$ -
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ -**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 91,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ -
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 90,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-5B **Preliminary Construction Cost Estimate**
Alternative 3 - South Stand Area: Test Stand 12 (S-12)
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.8	MO	$ 67,300	$ 51,504
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	0	SF	$ 8	$ -
C2f	Test Stand Demolition	5,204	SF	$ 40	$ 208,160
C2g	Concrete/Cinderblock Encapsulation	0	SF	$ 13	$ -
C2h	Light Ballast Removal	4	EA	$ 41	$ 165
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ 10,330	$ 10,330
C2k	Lead Based Paint Abatement	0	SF	$ 30	$ -
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	0	LF	$ 53	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 288,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 14,400
	Professional/Tech. - Remedial Design	6%			$ 17,280
	Professional/Tech. - Construction Mgmt	4%			$ 11,520
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 43,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 331,000*
	Contingency Allowance	20%			$ 66,200
Total Capital Cost (Rounded to Nearest $1,000)					**$ 397,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	0	Each	$ 9,800	$ -
O1b	Encapsulation Restoration	0	SF	$ 40	$ -
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ -*
Annual Indirect O&M Costs					
	Administration	5%			$ -
	Insurance, Taxes, Licenses	3%			$ -
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ -*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ -*
	Contingency Allowance	25%			$ -
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ -**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 397,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ -
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 400,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-6A **Preliminary Construction Cost Estimate**
Alternative 2 - South Stand Area: Building S-46
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.5	MO	$ 67,300	$ 37,008
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	0	SF	$ 8	$ -
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	4,949	SF	$ 13	$ 64,691
C2h	Light Ballast Removal	1	EA	$ 41	$ 41
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ 17,750	$ 17,750
C2k	Lead Based Paint Abatement	3	SF	$ 30	$ 75
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	0	LF	$ 53	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 137,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 6,850
	Professional/Tech. - Remedial Design	6%			$ 8,220
	Professional/Tech. - Construction Mgmt	4%			$ 5,480
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 21,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 158,000*
	Contingency Allowance	20%			$ 31,600
Total Capital Cost (Rounded to Nearest $1,000)					**$ 190,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	1	Each	$ 9,800	$ 9,800
O1b	Encapsulation Restoration	50	SF	$ 40	$ 2,000
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ 12,000*
Annual Indirect O&M Costs					
	Administration	5%			$ 600
	Insurance, Taxes, Licenses	3%			$ 300
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ 1,000*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ 13,000*
	Contingency Allowance	25%			$ 3,250
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ 16,000**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 190,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ 199,000
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 390,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-6B **Preliminary Construction Cost Estimate**
Alternative 3 - South Stand Area: Building S-46
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.7	MO	$ 67,300	$ 48,981
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	4949	SF	$ 13	$ 64,337
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	4,949	SF	$ 8	$ 39,592
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	0	SF	$ 13	$ -
C2h	Light Ballast Removal	1	EA	$ 41	$ 41
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ 17,750	$ 17,750
C2k	Lead Based Paint Abatement	3	SF	$ 30	$ 75
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	0	LF	$ 53	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 188,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 9,400
	Professional/Tech. - Remedial Design	6%			$ 11,280
	Professional/Tech. - Construction Mgmt	4%			$ 7,520
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 28,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 216,000*
	Contingency Allowance	20%			$ 43,200
Total Capital Cost (Rounded to Nearest $1,000)					**$ 259,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	0	Each	$ 9,800	$ -
O1b	Encapsulation Restoration	0	SF	$ 40	$ -
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ -*
Annual Indirect O&M Costs					
	Administration	5%			$ -
	Insurance, Taxes, Licenses	3%			$ -
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ -*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ -*
	Contingency Allowance	25%			$ -
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ -**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 259,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ -
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 260,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-7 **Preliminary Construction Cost Estimate**
Alternative 2 and 3 - East Stand Area: Building R-29
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.1	MO	$ 67,300	$ 6,730
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	0	SF	$ 8	$ -
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	0	SF	$ 13	$ -
C2h	Light Ballast Removal	0	EA	$ 41	$ -
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ 6,720	$ 6,720
C2k	Lead Based Paint Abatement	0	SF	$ 30	$ -
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	0	LF	$ 53	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 31,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 1,550
	Professional/Tech. - Remedial Design	6%			$ 1,860
	Professional/Tech. - Construction Mgmt	4%			$ 1,240
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 5,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 36,000*
	Contingency Allowance	20%			$ 7,200
Total Capital Cost (Rounded to Nearest $1,000)					**$ 43,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	0	Each	$ 9,800	$ -
O1b	Encapsulation Restoration	0	SF	$ 40	$ -
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ -*
Annual Indirect O&M Costs					
	Administration	5%			$ -
	Insurance, Taxes, Licenses	3%			$ -
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ -*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ -*
	Contingency Allowance	25%			$ -
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ -**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 43,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ -
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 40,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-8A **Preliminary Construction Cost Estimate**
Alternative 2 - East Stand Area: Building R-21
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.4	MO	$ 67,300	$ 26,284
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	0	SF	$ 8	$ -
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	3,515	SF	$ 13	$ 45,947
C2h	Light Ballast Removal	0	EA	$ 41	$ -
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ 47,370	$ 47,370
C2k	Lead Based Paint Abatement	24	SF	$ 30	$ 716.00
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	0	LF	$ 53	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 138,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 6,900
	Professional/Tech. - Remedial Design	6%			$ 8,280
	Professional/Tech. - Construction Mgmt	4%			$ 5,520
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 21,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 159,000*
	Contingency Allowance	20%			$ 31,800
Total Capital Cost (Rounded to Nearest $1,000)					**$ 191,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	1	Each	$ 9,800	$ 9,800
O1b	Encapsulation Restoration	36	SF	$ 40	$ 1,440
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ 11,000*
Annual Indirect O&M Costs					
	Administration	5%			$ 550
	Insurance, Taxes, Licenses	3%			$ 275
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ 1,000*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ 12,000*
	Contingency Allowance	25%			$ 3,000
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ 15,000**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 191,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ 186,000
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 380,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-8B **Preliminary Construction Cost Estimate**
Alternative 3 - East Stand Area: Building R-21
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.5	MO	$ 67,300	$ 34,788
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	3515	SF	$ 12	$ 42,180
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	3,515	SF	$ 8	$ 28,120
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	0	SF	$ 13	$ -
C2h	Light Ballast Removal	0	EA	$ 41	$ -
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ 47,370	$ 47,370
C2k	Lead Based Paint Abatement	24	SF	$ 30	$ 716
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	0	LF	$ 53	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 171,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 8,550
	Professional/Tech. - Remedial Design	6%			$ 10,260
	Professional/Tech. - Construction Mgmt	4%			$ 6,840
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 26,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 197,000*
	Contingency Allowance	20%			$ 39,400
Total Capital Cost (Rounded to Nearest $1,000)					**$ 236,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	0	Each	$ 9,800	$ -
O1b	Encapsulation Restoration	0	SF	$ 40	$ -
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ -*
Annual Indirect O&M Costs					
	Administration	5%			$ -
	Insurance, Taxes, Licenses	3%			$ -
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ -*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ -*
	Contingency Allowance	25%			$ -
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ -**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 236,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ -
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 240,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-9 **Preliminary Construction Cost Estimate**
Alternative 2 and 3 - East Stand Area: Building R-51
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.1	MO	$ 67,300	$ 6,730
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	0	SF	$ 8	$ -
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	0	SF	$ 13	$ -
C2h	Light Ballast Removal	0	EA	$ 41	$ -
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ 1,900	$ 1,900
C2k	Lead Based Paint Abatement	24	SF	$ 30	$ 716
C2l	Sludge Disposal	0	DRUM	$ 373	$ -
C2m	Institutional Controls	0	LF	$ -	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 27,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 1,350
	Professional/Tech. - Remedial Design	6%			$ 1,620
	Professional/Tech. - Construction Mgmt	4%			$ 1,080
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 4,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 31,000*
	Contingency Allowance	20%			$ 6,200
Total Capital Cost (Rounded to Nearest $1,000)					**$ 37,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	0	Each	$ 9,800	$ -
O1b	Encapsulation Restoration	0	SF	$ 40	$ -
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ -*
Annual Indirect O&M Costs					
	Administration	5%			$ -
	Insurance, Taxes, Licenses	3%			$ -
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ -*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ -*
	Contingency Allowance	25%			$ -
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ -**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 37,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ -
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 40,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-10A **Preliminary Construction Cost Estimate**
Alternative 2 - East Stand Area: Test Stand 4
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.3	MO	$ 67,300	$ 19,083
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	0	SF	$ 8	$ -
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	2,552	SF	$ 13	$ 33,359
C2h	Light Ballast Removal	1	EA	$ 41	$ 41
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ 20,830	$ 20,830
C2k	Lead Based Paint Abatement	721	SF	$ 30	$ 21,510
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	420	LF	$ 53	$ 22,230
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 135,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 6,750
	Professional/Tech. - Remedial Design	6%			$ 8,100
	Professional/Tech. - Construction Mgmt	4%			$ 5,400
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 20,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 155,000*
	Contingency Allowance	20%			$ 31,000
Total Capital Cost (Rounded to Nearest $1,000)					**$ 186,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	1	Each	$ 9,800	$ 9,800
O1b	Encapsulation Restoration	26	SF	$ 40	$ 1,040
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ 11,000*
Annual Indirect O&M Costs					
	Administration	5%			$ 550
	Insurance, Taxes, Licenses	3%			$ 275
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ 1,000*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ 12,000*
	Contingency Allowance	25%			$ 3,000
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ 15,000**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 186,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ 186,000
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 370,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-10B **Preliminary Construction Cost Estimate**
Alternative 3 - East Stand Area: Test Stand 4
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.4	MO	$ 67,300	$ 24,812
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	2507	SF	$ 12	$ 30,084
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	2,507	SF	$ 8	$ 20,056
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	0	SF	$ 13	$ -
C2h	Light Ballast Removal	4	EA	$ 41	$ 165
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ 20,830	$ 20,830
C2k	Lead Based Paint Abatement	721	SF	$ 30	$ 21,510
C2l	Water and Sludge Disposal	0	Drum	$ 373	$ -
C2m	Institutional Controls	0	LF	$ 53	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 135,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 6,750
	Professional/Tech. - Remedial Design	6%			$ 8,100
	Professional/Tech. - Construction Mgmt	4%			$ 5,400
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 20,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 155,000*
	Contingency Allowance	20%			$ 31,000
Total Capital Cost (Rounded to Nearest $1,000)					**$ 186,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	0	Each	$ 9,800	$ -
O1b	Encapsulation Restoration	0	SF	$ 40	$ -
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ -*
Annual Indirect O&M Costs					
	Administration	5%			$ -
	Insurance, Taxes, Licenses	3%			$ -
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ -*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ -*
	Contingency Allowance	25%			$ -
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ -**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 186,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ -
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 190,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

TableA-11 **Preliminary Construction Cost Estimate**
Alternative 2 & 3 - East Stand Area: Cistern/Cistern Pump
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.05	MO	$ 67,300	$ 3,365
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	0	SF	$ 8	$ -
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	0	SF	$ 13	$ -
C2h	Light Ballast Removal	0	EA	$ 41	$ -
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ -	$ -
C2k	Lead Based Paint Abatement	0	SF	$ 30	$ -
C2l	Surface Water Removal	23	DRUM	$ 373	$ 8,679
C2m	Institutional Controls	0	LF	$ -	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 30,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 1,500
	Professional/Tech. - Remedial Design	6%			$ 1,800
	Professional/Tech. - Construction Mgmt	4%			$ 1,200
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 5,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 35,000*
	Contingency Allowance	20%			$ 7,000
Total Capital Cost (Rounded to Nearest $1,000)					**$ 42,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	0	Each	$ 9,800	$ -
O1b	Encapsulation Restoration	0	SF	$ 40	$ -
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ -*
Annual Indirect O&M Costs					
	Administration	5%			$ -
	Insurance, Taxes, Licenses	3%			$ -
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ -*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ -*
	Contingency Allowance	25%			$ -
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ -**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 42,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ -
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 40,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot

Table A-12 **Preliminary Construction Cost Estimate**
Alternative 2 & 3 - East Stand Area: No. 2 Sewage Treatment Plant
Focused Feasibility Study
Radiation Technology, Inc. Superfund Site
Operable Unit 3
Rockaway Township, Morris County, New Jersey

Item	Description	Quantity	Unit	COST/UNIT	Cost
Direct Capital Costs					
C1a	Field Overhead and Oversight	0.05	MO	$ 67,300	$ 3,365
C1b	Plans and Submittals	0.06	LS	$ 100,000	$ 6,250
C1c	Mobilization/Demobilization	0.06	LS	$ 17,500	$ 1,094
C2a	Clearing	0.1	ACRE	$ 19,600	$ 1,960
C2b	Concrete Slab Demolition (Non-Hazardous)	0	SF	$ 12	$ -
C2c	Concrete Slab Demolition (Hazardous)	0	SF	$ 13	$ -
C2d	Cinderblock Wall Demolition	0	SF	$ 10	$ -
C2e	Miscellaneous Debris and C&D Demolition	0	SF	$ 8	$ -
C2f	Test Stand Demolition	0	SF	$ 40	$ -
C2g	Concrete/Cinderblock Encapsulation	0	SF	$ 13	$ -
C2h	Light Ballast Removal	0	EA	$ 41	$ -
C2i	Refrigerant Removal	0	EA	$ 993	$ -
C2j	Asbestos Abatement	0	LS	$ -	$ -
C2k	Lead Based Paint Abatement	0	SF	$ 30	$ -
C2l	Surface Water Removal	33	DRUM	$ 373	$ 12,341
C2m	Institutional Controls	0	LF	$ -	$ -
C2n	SHPO Archeological Survey	1	LF	$ 8,333	$ 8,333
Total Direct Capital Costs (Rounded to Nearest $1,000)					*$ 33,000*
Indirect Capital Costs					
	Professional/Tech. - Project Management	5%			$ 1,650
	Professional/Tech. - Remedial Design	6%			$ 1,980
	Professional/Tech. - Construction Mgmt	4%			$ 1,320
Total Indirect Capital Costs (Rounded to Nearest $1,000)					*$ 5,000*
Total Capital Costs					
	Subtotal Capital Costs				*$ 38,000*
	Contingency Allowance	20%			$ 7,600
Total Capital Cost (Rounded to Nearest $1,000)					**$ 46,000**

Item	Description	Quantity	Unit	COST/UNIT	Cost
Annual Direct O&M Costs					
O1a	Encapsulation Inspection Report	0	Each	$ 9,800	$ -
O1b	Encapsulation Restoration	0	SF	$ 40	$ -
Total Annual Direct O&M Costs (Rounded to Nearest $1,000)					*$ -*
Annual Indirect O&M Costs					
	Administration	5%			$ -
	Insurance, Taxes, Licenses	3%			$ -
Total Annual Indirect O&M Costs (Rounded to Nearest $1,000)					*$ -*
Total Annual O&M Costs					
	Subtotal Annual O&M Costs				*$ -*
	Contingency Allowance	25%			$ -
Total Annual O&M Cost (Rounded to Nearest $1,000)					**$ -**

30 Year Cost Projection (Discount Rate: 7%)	
Total Capital Costs	$ 46,000
Present Worth of 30 Years O&M (Rounded to Nearest $1,000)	$ -
Total Cost: Alternative 2 (Rounded to nearest $10,000)	**$ 50,000**

Key:

CY = Cubic yard
EA = Each
LF = Linear foot
LS = Lump sum
MO = Month
O & M = Operations and maintenance
SF = Square foot